



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

August 27, 2012

Engineering/Planning Division
Geo-Environmental Engineering Branch

Ms. Lynne Jennings
EPA - New England, Region 1
5 Post Office Square - Suite 100
Mail Code OSRR7-3
Boston, Massachusetts 02109-3912

Mr. Len Pinaud
Commonwealth of Massachusetts
Department of Environmental Protection – Southeast Regional Office
20 Riverside Drive
Lakeville, Massachusetts 02347

Re: Impact Area Groundwater Study Program (IAGWSP), Western Boundary Interim
Environmental Monitoring Report – October 2010 through September 2011, dated August 2012

Dear Ms. Jennings and Mr. Pinaud:

On behalf of the Army National Guard's Impact Area Groundwater Study Program (IAGWSP), the U.S. Army Corps of Engineers (USACE) is pleased to provide the Final version of the subject report.

The Draft version of this document was submitted in January 2012. Comments were received from the U.S. Environmental Protection Agency (EPA) in a letter dated May 23, 2012, and from the Massachusetts Department of Environmental Protection (MassDEP) in a letter dated May 14, 2012. A Response to Comments Letter (RCL) was written on June 15, 2012. MassDEP approved the RCL on June 27, 2012. Comments received from the Bourne Water District, Board of Water Commissioners and EPA have been incorporated in to this Final version of the report. A signed Project Note, documenting changes to the monitoring well network, is included as Appendix A of this document.

Please contact Dave Hill of the IAGWSP, or Mark Anderson of the USACE, if there are any questions.

Sincerely,

[Handwritten initials 'AM' over signature] Anthony T. Mackos, P.E.
Chief, Engineering/Planning Division

Enclosures:

EPA 1 copy and 1 CD
MassDEP 1 copy and 1 CD

Copy Furnished:

IAGWSP: Ben Gregson (letter only), Dave Hill (1 copy), and Marcia Goulet (5 copies and 2 CDs)
EPA: Bob Lim (1 copy), Erin Sanborn (1 CD)



Impact Area Groundwater Study Program

FINAL

Western Boundary Interim Environmental Monitoring Report October 2010 through September 2011

**Camp Edwards
Massachusetts Military Reservation
Cape Cod, Massachusetts**

August 2012

Prepared for:

Army National Guard
Impact Area Groundwater Study Program
Camp Edwards, Massachusetts

Prepared by:

U.S. Army Corps of Engineers
New England District
Concord, Massachusetts

DISCLAIMER

This document has been prepared pursuant to government administrative orders (U.S. EPA Region I SDWA Docket No. I-97-1019 and 1-2000-0014) and is subject to approval by the U. S. Environmental Protection Agency. The opinions, findings, and conclusions expressed are those of the authors and not necessarily those of the Environmental Protection Agency.

TABLE OF CONTENTS

	Page
1.0 INTRODUCTION.....	1
2.0 SAMPLING PROGRAM.....	2
3.0 MONITORING RESULTS	3
3.1 Perchlorate	3
3.2 Other Parameters	3
4.0 RECOMMENDATIONS.....	5
5.0 REFERENCES.....	6

FIGURES

- Figure 1-1 Location of Western Boundary
- Figure 2-1 Western Boundary Environmental Monitoring – Wells in the Monitoring Network
- Figure 3-1 Western Boundary Perchlorate Detections – October 2010 through September 2011
- Figure 3-2 Western Boundary Perchlorate Concentration Trends in Selected Wells through September 2011
- Figure 4-1 Western Boundary Environmental Monitoring– Proposed Groundwater Monitoring Well Network

TABLES

- Table 2-1 Western Boundary – Groundwater Monitoring Well Network
October 2010 - September 2011
- Table 3-1 Western Boundary Perchlorate Results
October 2010 through September 2011
- Table 3-2 Western Boundary Explosives, Metals, VOCs, and SVOCs Results
October 2010 through September 2011
- Table 3-3 Western Boundary Groundwater Screening Criteria
Analytes Detected During the 2010 – 2011 Reporting Period
- Table 4-1 Western Boundary – Proposed Changes to Groundwater Monitoring Well Network and Sampling Schedule
- Table 4-2 Western Boundary – Proposed Groundwater Monitoring Well Network

**TABLE OF CONTENTS
(Concluded)**

APPENDIX

Appendix A Project Note – Optimization of Western Boundary Chemical Monitoring Plan, July 16, 2012

1.0 INTRODUCTION

The Western Boundary Study Area is part of the Impact Area Groundwater Study Program (IAGWSP) at the Massachusetts Military Reservation (MMR). The Western Boundary consists of two distinct geographic sub-regions: 1) the Bourne Water District's Monument Beach Drinking Water Well Field located in the town of Bourne and 2) the southwestern portion of Camp Edwards Impact Area (Figure 1-1).

In 1999, five monitoring well clusters (MW-80 through MW-84) were installed at the base boundary to evaluate groundwater quality upgradient of the Monument Beach drinking water wells. Perchlorate was first detected in monitoring well MW-80M1 in August 2001 at a concentration of 1.7 micrograms per liter ($\mu\text{g/L}$). Additional monitoring wells were installed within the Monument Beach well field beginning in 2002 to monitor groundwater quality upgradient of the water supply wells, and downgradient of MMR.

In response to the perchlorate detection at the base boundary, routine sampling for perchlorate at the water supply wells in the Monument Beach Well Field and nearby monitoring wells was implemented. Analytical results received in February and March 2002 indicated the presence of perchlorate at low concentrations (i.e., less than 1 $\mu\text{g/L}$) in groundwater samples collected from within the well field. In response to these detections, an investigation was initiated to characterize the extent of perchlorate in groundwater in the Western Boundary. As part of the investigation, groundwater samples were collected from selected wells within the Western Boundary study area. Laboratory results have been documented in a series of interim reports; the latest report was submitted in May 2011 (USACE, 2011) and covered groundwater sampling between October 2009 and September 2010. A comprehensive presentation of investigation findings, including summaries of past groundwater monitoring results, is provided in the *Final Western Boundary Remedial Investigation/Feasibility Study (RI/FS) Report* (Tetra Tech, 2009).

The groundwater results presented herein are for Western Boundary samples collected during sampling rounds performed in 2010 and 2011, covering the monitoring period October 2010 through September 2011. Results from future groundwater monitoring events will continue to be reported in Interim Environmental Monitoring Reports until a final Environmental Monitoring Work Plan is approved by the EPA. The Environmental Monitoring Work Plan will be designed to demonstrate compliance with established cleanup levels and will include sampling locations and frequencies, appropriate statistical modeling or other data interpretation techniques and a proposal to demonstrate that groundwater quality is sustained in the future.

2.0 SAMPLING PROGRAM

Groundwater sample collection during the 2010-2011 monitoring period was conducted in accordance with the September 6, 2006 project note entitled *Western Boundary Interim Groundwater Monitoring Plan* (IAGWSP, 2006). Table 2-1 lists the 72 wells that were selected for the Western Boundary monitoring network. Well construction details (where available), analysis parameters, and associated sampling frequencies are also provided in the table. Well locations are depicted in Figure 2-1.

Samples collected during the 2010-2011 monitoring period were analyzed for: explosives compounds by EPA Method 8330; total metals (except mercury) by EPA Method 6010B, mercury by EPA method 7470A, volatile organic compounds (VOCs) by EPA Method 8260B; and semi-volatile organic compounds (SVOCs) using EPA Method 8270C. Perchlorate samples were analyzed by EPA Method 6850.

3.0 MONITORING RESULTS

A summary of analytical results for groundwater samples collected during the 2010-2011 reporting period are presented in Tables 3-1 and 3-2. Detected analytes were compared to established groundwater screening criteria (i.e., Federal Maximum Contaminant Levels [MCL]; EPA Lifetime Health Advisory Values [HA]; EPA Regional Screening Levels (RSL); and Massachusetts Contingency Plan [MCP] Method 1 GW-1 standards (Table 3-3). Notable detections and concentration trends are summarized by analytical parameter/parameter group in the following sections.

3.1 Perchlorate

Table 3-1 provides a summary of perchlorate results by well for samples collected during the 2010-2011 reporting period. Of the 183 samples analyzed during this period, detectable concentrations or perchlorate were found in 70 samples. Results ranged from non-detected (ND) to a maximum concentration of 0.62 µg/L (in well XXM975). It is noted that the perchlorate analytical method used until October 2009 was EPA method E314.0, which had a reporting limit of 1.0 µg/L (and method detection limit (MDL) of 0.35 µg/L). EPA method SW6850, which is currently in use, has a reporting limit of 0.2 µg/L and MDL of 0.04 µg/L. Therefore, first time detections at concentrations less than 0.35 µg/L are likely a result of enhanced method sensitivity, and not necessarily indicative of contamination which was not present previously.

There is no federally-promulgated MCL for perchlorate in drinking water. The Commonwealth of Massachusetts Maximum Contaminant Level (MMCL) for perchlorate in drinking water is 2 µg/L while the EPA Lifetime Health Advisory for perchlorate in drinking water is 15 µg/L. None of the detected perchlorate concentrations exceeded the 2 µg/L MMCL. Figure 3-1 depicts the lateral distribution of detectable perchlorate within the study area based on maximum values observed in each well sampled during the reporting period.

The highest historical concentrations of perchlorate within the Western Boundary study area have been observed in wells MW-267M1, MW-233M3, MW-80M1, MW-276M3, and MW-213M3. Each of these wells exhibit long term declining trends in perchlorate concentrations over their sampling histories (Figure 3-2). Wells within the Monument Beach Well Field (MW-02-05M2 and XXM975) continue to exhibit low perchlorate concentrations, most of which are at or below the laboratory reporting limit (RL).

3.2 Other Parameters

- **Explosives** – Consistent with all prior groundwater monitoring results for Western Boundary, no explosives compounds were detected among the 33 samples collected and analyzed during the 2010-2011 reporting period (Table 3-2).
- **Metals** – Eighteen metals [aluminum, barium, boron, calcium, chromium (total), cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium,

selenium, sodium, thallium, and zinc] were detected among the 13 samples analyzed for total metals (Table 3-2). None of the metals detected exceeded their applicable screening levels (Table 3-3).

- **Volatile Organic Compounds (VOCs)** – Fourteen samples (including one duplicate) were collected for analysis of VOCs during the reporting period. Three VOCs (chloroform, dibromomethane, and trans-1,3-dichloropropene) were detected. Chloroform was the most frequently reported compound – it was found in 13 samples (including one duplicate) with detected concentrations ranging from 0.49 J µg/L to 1.8 µg/L (Table 3-2). All of these concentration values exceeded the 0.19 µg/L RSL (Table 3-3). Because chloroform has been shown to be ubiquitous within the MMR aquifer and present in much of the groundwater on Cape Cod, this analyte is presumed to be unrelated to past activities within the Western Boundary study area.

Dibromomethane and trans-1,3-dichloropropene were detected in the sample collected from well MW-213M2 at estimated concentrations of 0.15 J µg/L and 0.19 J µg/L, respectively (Table 3-2). Neither analyte exceeded applicable screening values (Table 3-3).

- **Semi-Volatile Organic Compounds (SVOCs)** - No detectable concentrations of SVOCs were reported among the 13 samples analyzed during the 2010-2011 reporting period (Table 3-2).

4.0 RECOMMENDATIONS

In consideration of the consistently low and declining perchlorate concentrations observed throughout the Western Boundary groundwater monitoring network over the past eleven years of sampling and the lack of significant detections of other analytes, a reduction in the scale of the program is warranted. Accordingly, an optimized program for perchlorate sampling is being developed to effectively and more efficiently monitor perchlorate in Western Boundary groundwater. The Western Boundary Long Term Monitoring Plan is being prepared in accordance with the *Decision Document for Western Boundary, Demolition Area 2, and Northwest Corner Soil and Groundwater Operable Units* (EPA, 2010). The groundwater monitoring well network optimization includes recommendations for fewer network wells and less frequent sampling.

Table 4-1 lists the wells currently in the Western Boundary network. Table 4-2 provides well construction details, sampling frequencies, and monitoring rationale for wells proposed to be retained in the optimized Western Boundary perchlorate groundwater monitoring program. The corresponding well locations are shown in Figure 4-1. Due to the lack of significant detections during the current and prior reporting periods, explosives, metals, VOCs, and SVOCs are recommended for removal from the list of analytes. This approved change to the monitoring well network is described in the Project Note included as Appendix A.

5.0 REFERENCES

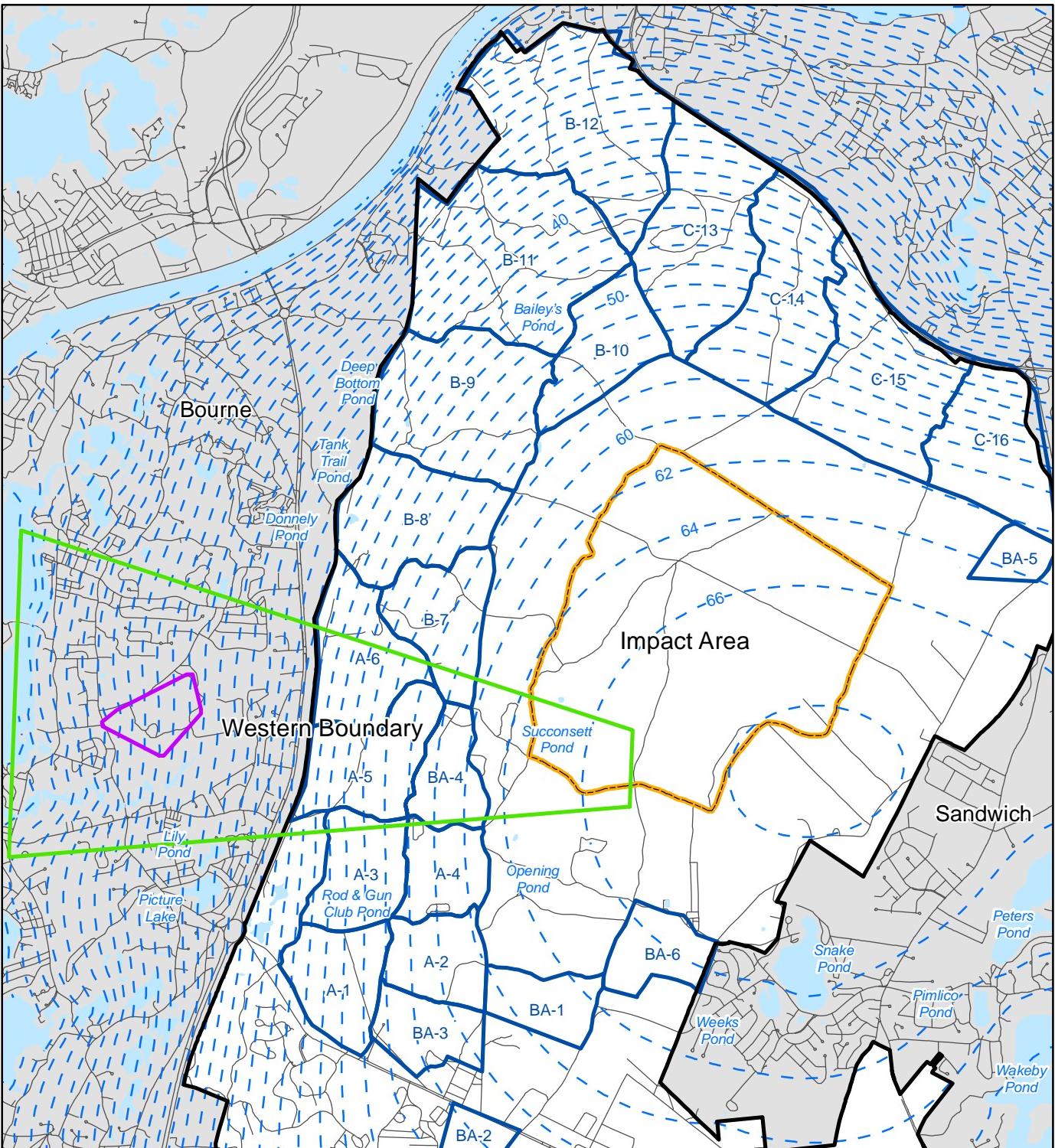
EPA, 2010. *Decision Document for Western Boundary, Demolition Area 2, and Northwest Corner Soil and Groundwater Operable Units*. United States Environmental Protection Agency Region 1. March 2010. (EDMS Document No. 9382).

IAGWSP, 2006. *Western Boundary Interim GMP Project Note*. Impact Area Groundwater Study Program, Massachusetts Military Reservation, Cape Cod, Massachusetts. September 6, 2006. (EDMS Document No. 8665).

Tetra Tech, 2009. *Final Western Boundary Remedial Investigation/Feasibility Study Report*. Impact Area Groundwater Study Program, Massachusetts Military Reservation, Cape Cod, Massachusetts. Prepared by Tetra Tech EC, Inc., Boston, Massachusetts. September 18, 2009. (EDMS Document No. 9253).

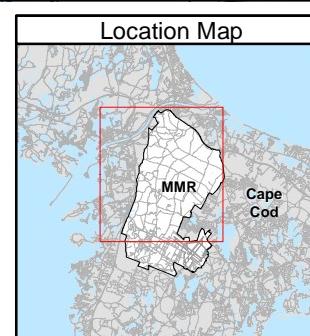
USACE, 2011. *Final Western Boundary Interim Environmental Monitoring Report October 2009 through September 2010*. Impact Area Groundwater Study Program, Massachusetts Military Reservation, Cape Cod, Massachusetts. Prepared by the U.S. Army Corps of Engineer, New England District, Concord, Massachusetts. May 2011. (EDMS Document No. 110759).

FIGURES

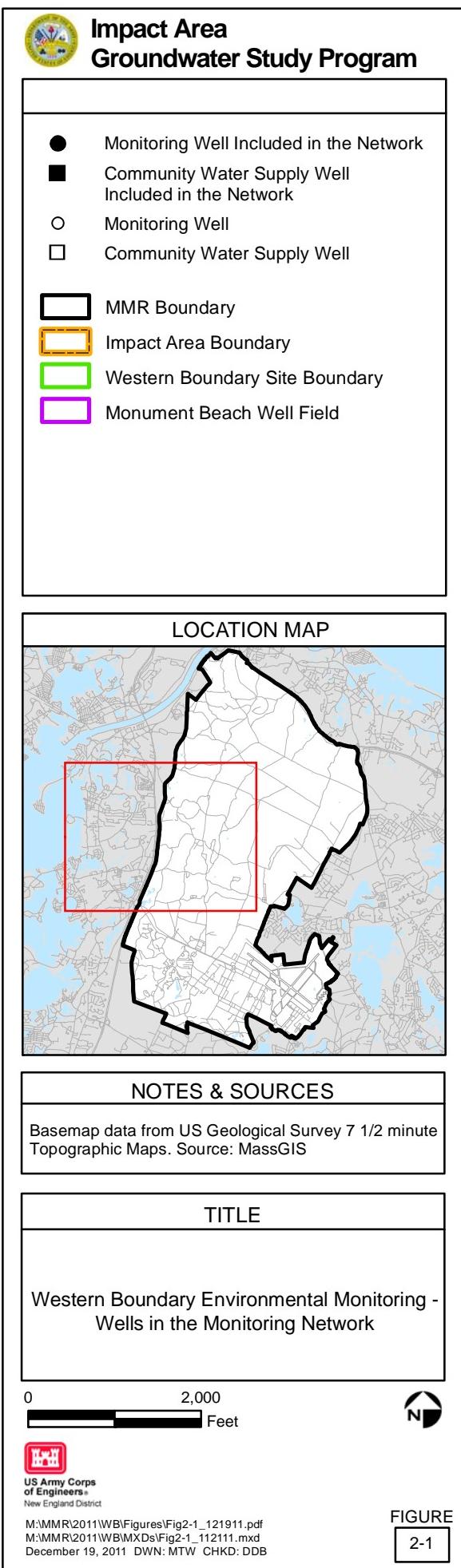
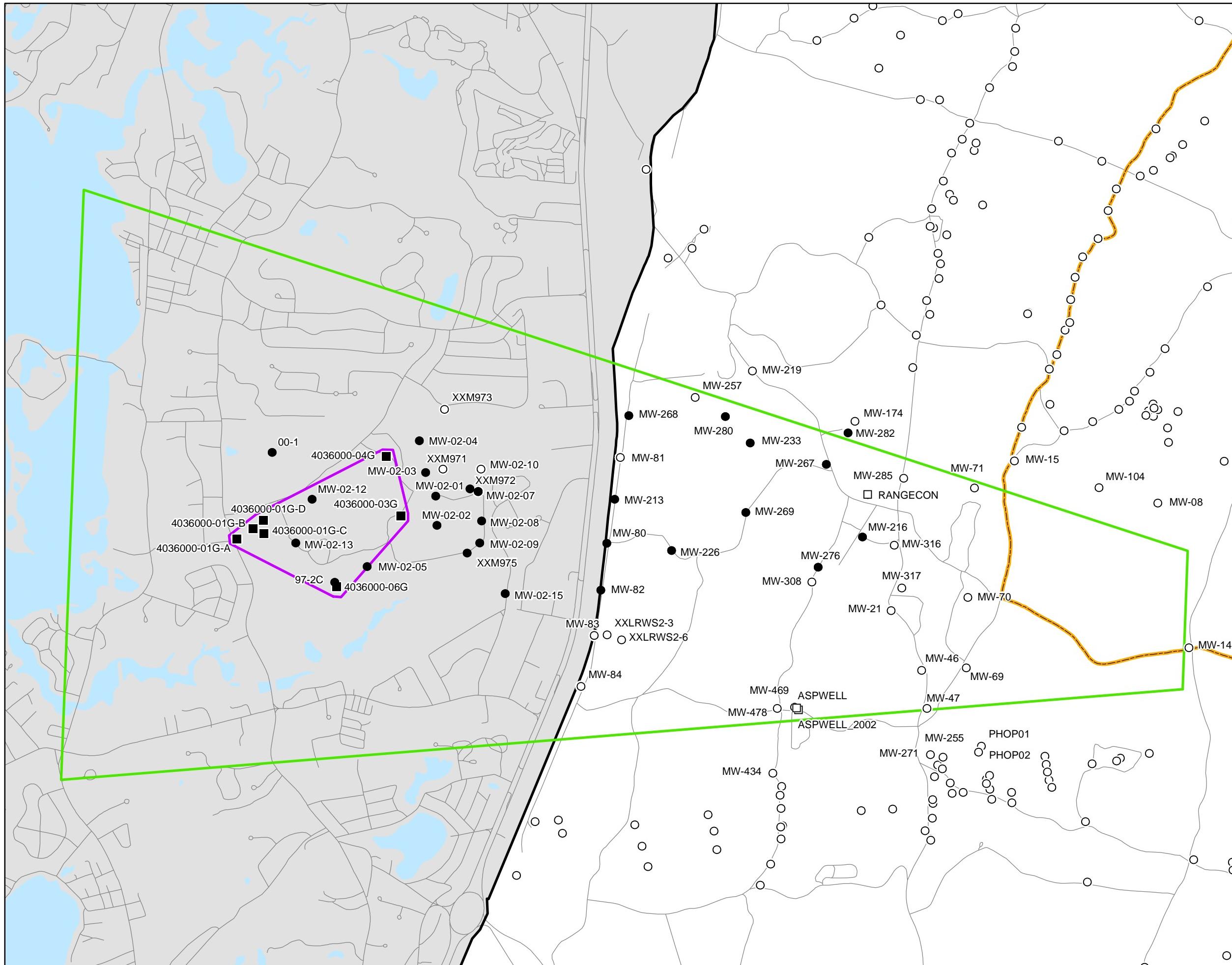


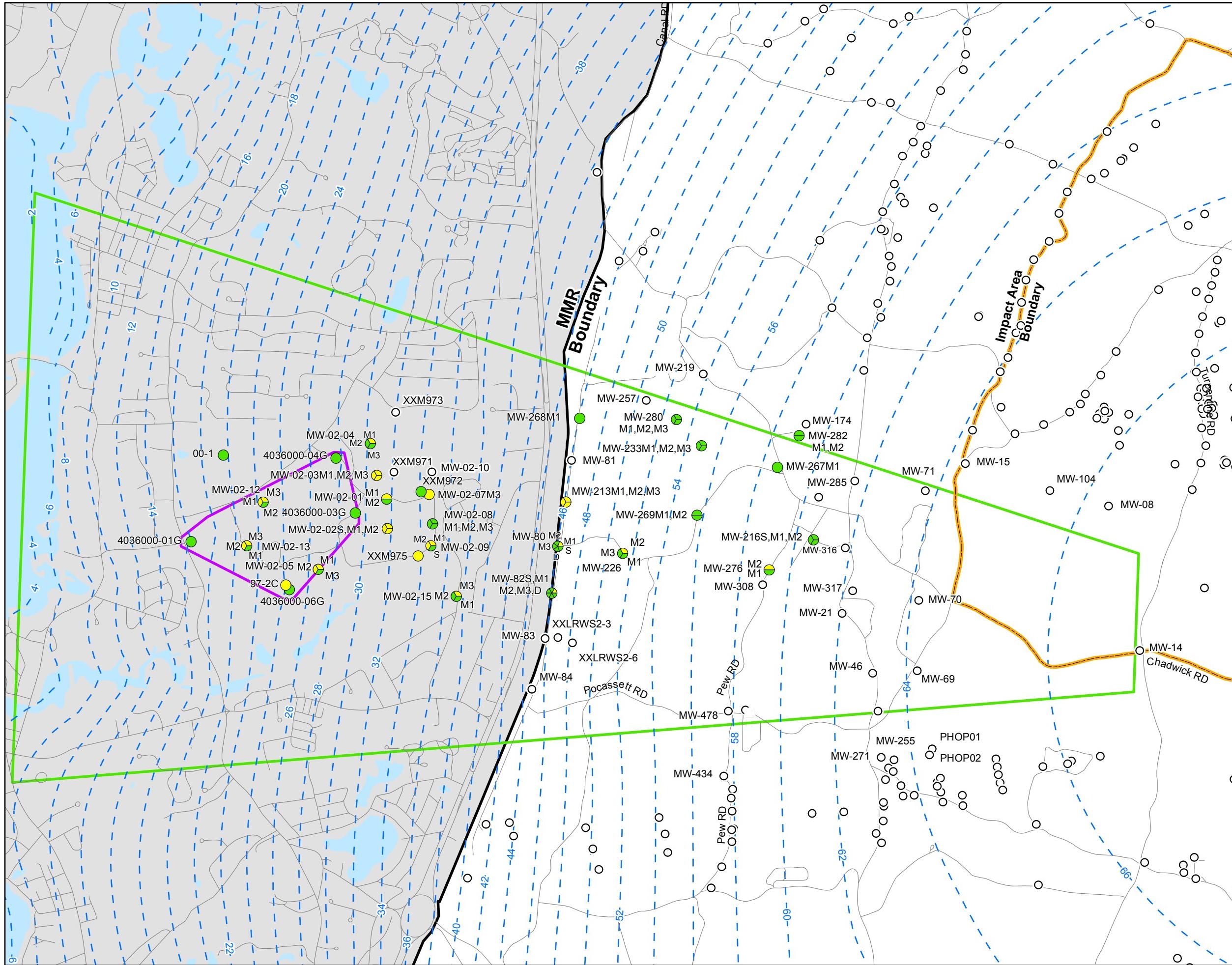
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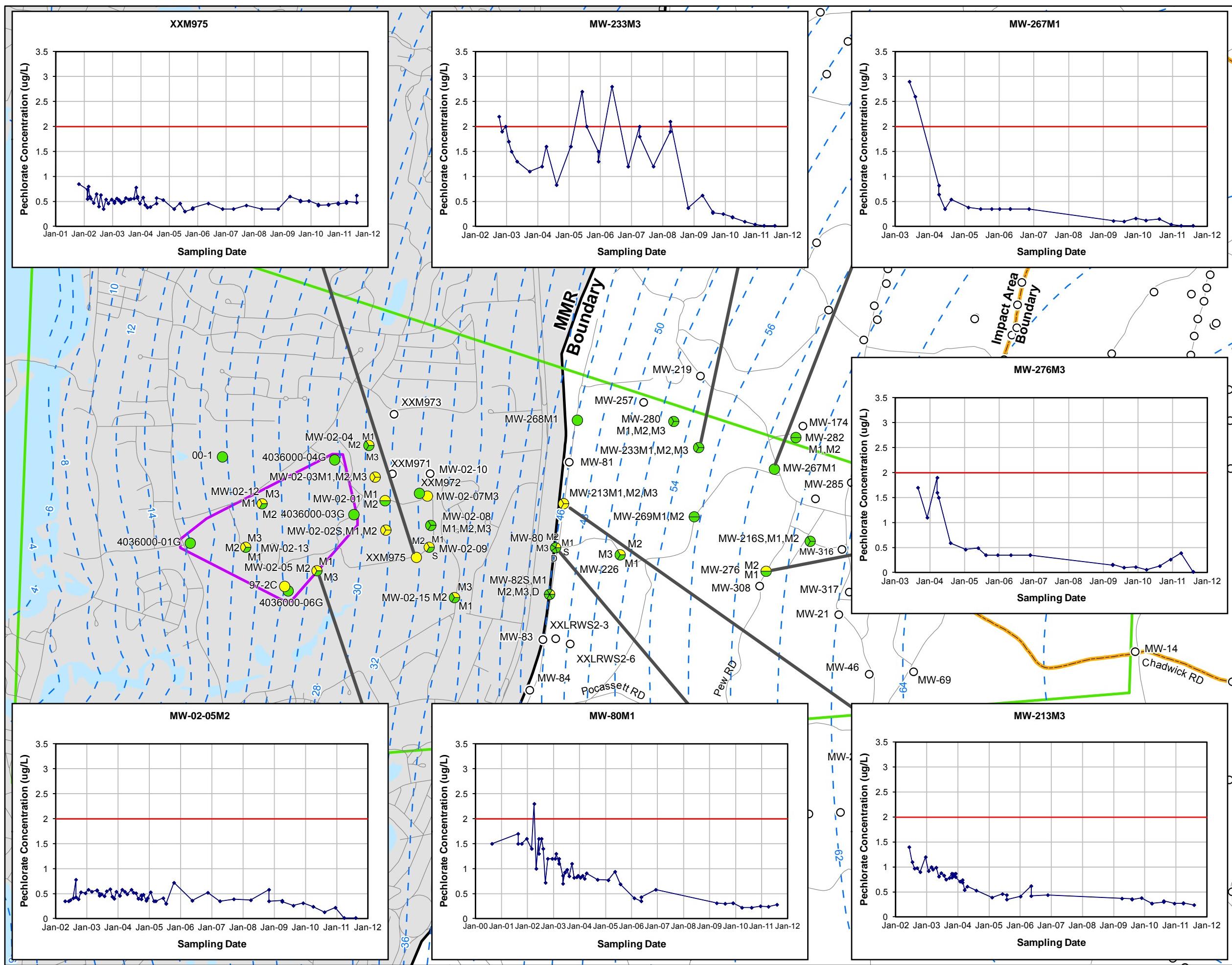
- MMR Boundary
 - Impact Area Boundary
 - Training Areas
 - Western Boundary Site Boundary
- Groundwater Elevation Contours
(in feet above NGVD)**
- - - Water Level Contours - MMR10
- Monument Beach Well Field



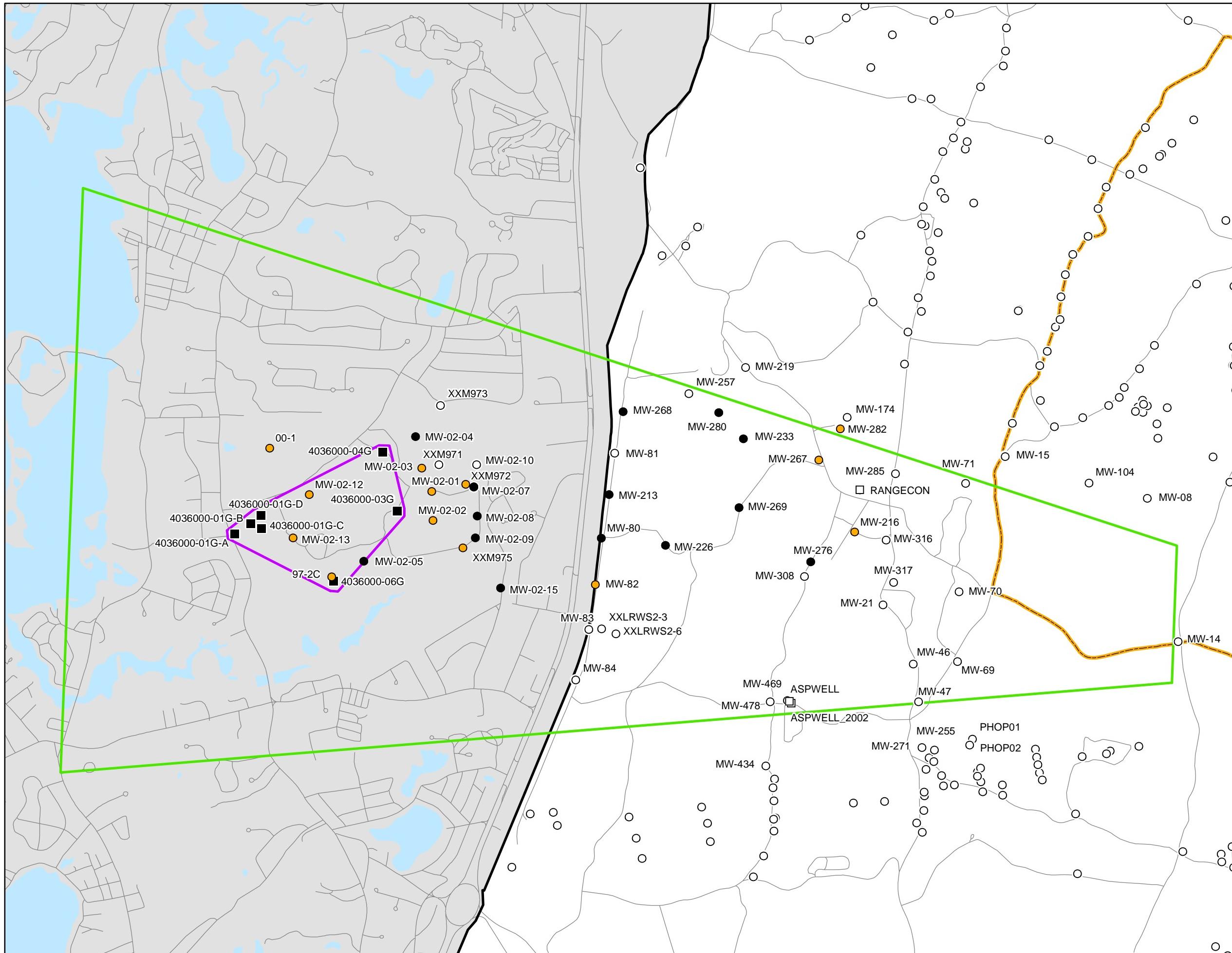
Location of Western Boundary







Impact Area Groundwater Study Program
LEGEND
Monitoring Wells
<ul style="list-style-type: none"> Well Not Included in the Network No Detection Detection at or below 2 µg/L Detection above 2 µg/L Indicates different detections in different well screens
Massachusetts Contingency Plan GW-1 Standard (Red line)
MMR Boundary (Black line)
Impact Area Boundary (Orange line)
Western Boundary Site Boundary (Green line)
Monument Beach Well Field (Purple line)
Groundwater Elevation Contours (in feet above NGVD)
Water Level Contours - MMR10 (Dashed blue lines)
LOCATION MAP
NOTES & SOURCES
Basemap data from US Geological Survey 7 1/2 minute Topographic Maps. Source: MassGIS
TITLE
Western Boundary Perchlorate Concentration Trends in Selected Wells Through September 2011
0 2,000 Feet
US Army Corps of Engineers® New England District
M:\MMR\2011\WB\Figures\Fig3-2_060112.pdf M:\MMR\2011\WB\MXDs\Fig3-2_112111.mxd June 1, 2012 DWN: MTW CHKD: DDB
FIGURE 3-2

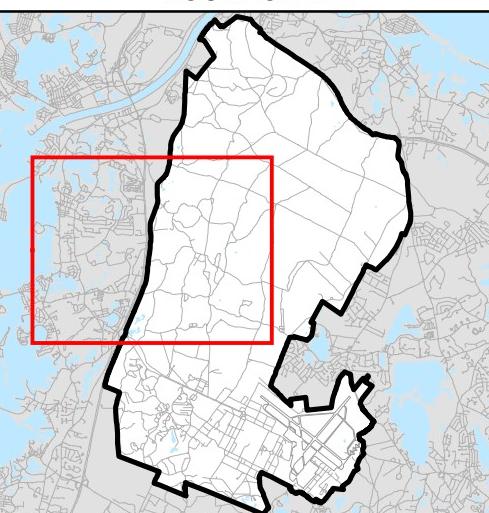




Impact Area Groundwater Study Program

- Monitoring Well Included in the Network
 - Community Water Supply Well Included in the Network
 - Monitoring Well
 - Community Water Supply Well
 - Monitoring Well Proposed to be Removed from the Network
 - MMR Boundary
 - Impact Area Boundary
 - Western Boundary Site Boundary
 - Monument Beach Well Field

LOCATION MAP



NOTES & SOURCES

Basemap data from US Geological Survey 7 1/2 minute Topographic Maps. Source: MassGIS

TITLE

Western Boundary Environmental Monitoring - Proposed Groundwater Monitoring Well Network

2,000
Feet



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New England District

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January 11, 2012 DWN: MTW CHKD: DDB

TABLES

Table 2-1
Western Boundary - Groundwater Monitoring Well Network
October 2010 - September 2011

Well ID	Northing (utm)	Easting (utm)	Ground Elevation (ft-msl)	Screen Top Elevation (ft-msl)	Screen Bottom Elevation (ft-msl)	Sample Collection Frequency	Tested Parameters
00-1	4618714.50	366433.84	57.79	-6.21	-12.21	T	P
4036000-01G	4618217.21	366248.29	-	-	-	T,Q	E,P
4036000-03G	4618381.83	367191.80	-	-	-	T,Q	E,P
4036000-04G	4618697.41	367080.81	-	-	-	T,Q	E,P
4036000-06G	4617941.90	366812.80	-	-	-	T,Q	E,P
97-2C	4617968.00	366792.38	78.99	-53.01	-53.01	T	P
MW-02-01M1	4618462.15	367371.51	81.71	-13.29	-23.29	T	P
MW-02-01M2	4618463.60	367370.73	81.71	-1.29	-11.29	T	P
MW-02-02M1	4618293.94	367379.20	81.40	-33.60	-43.60	T	P
MW-02-02M2	4618292.47	367374.13	81.40	-13.60	-23.60	T	P
MW-02-02S	4618292.76	367375.87	81.40	31.90	21.90	T	P
MW-02-03M1	4618598.06	367313.98	72.75	-57.25	-67.25	T	P
MW-02-03M2	4618598.18	367314.10	72.75	-19.25	-29.25	T	P
MW-02-03M3	4618598.29	367314.23	72.75	-2.25	-12.25	T	P
MW-02-04M1	4618780.52	367277.62	77.74	-45.26	-55.26	T	P
MW-02-04M2	4618780.63	367277.74	77.74	-20.26	-30.26	T	P
MW-02-04M3	4618780.75	367277.87	77.74	-5.26	-15.26	T	P
MW-02-05M1	4618058.32	366978.59	52.89	-57.11	-67.11	T	P
MW-02-05M2	4618058.44	366978.75	52.89	-39.11	-49.11	T	P
MW-02-05M3	4618058.56	366978.84	52.89	-17.11	-27.11	T	P
MW-02-07M3	4618488.98	367615.25	68.27	21.27	11.27	T	P
MW-02-08M1	4618319.81	367635.13	56.06	-51.94	-56.94	T	P
MW-02-08M2	4618319.93	367635.29	56.06	-25.94	-30.94	T	P
MW-02-08M3	4618320.05	367635.38	56.06	-5.94	-10.94	T	P
MW-02-09M1	4618193.90	367625.46	42.87	-31.13	-41.13	T	P
MW-02-09M2	4618194.02	367625.59	42.87	-16.13	-26.13	T	P
MW-02-09S	4618194.14	367625.74	42.87	35.87	25.87	A	P
MW-02-12M1	4618444.33	366662.10	69.04	-39.96	-49.96	T	P
MW-02-12M2	4618444.45	366662.22	69.04	-24.96	-34.96	T	P
MW-02-12M3	4618444.57	366662.35	69.04	-9.96	-19.96	T	P
MW-02-13M1	4618193.80	366568.28	54.74	-43.26	-53.26	T	P
MW-02-13M2	4618193.92	366568.37	54.74	-28.26	-38.26	T	P
MW-02-13M3	4618194.04	366568.50	54.74	-13.26	-23.26	T	P
MW-02-15M1	4617903.68	367771.64	87.54	-37.46	-47.46	A	P
MW-02-15M2	4617903.80	367771.79	87.54	-13.46	-23.46	A	P
MW-02-15M3	4617903.92	367771.89	87.54	6.54	-3.46	A	P
MW-213M1	4618444.84	368400.53	94.53	-38.47	-48.47	A	P
MW-213M2	4618444.95	368400.66	94.53	5.53	-4.47	A,A,A,A,T	E,SV,TM,P
MW-213M3	4618445.07	368400.78	94.53	17.53	12.53	A,A,A,A,T	E,SV,TM,P
MW-216M1	4618227.83	369822.02	259.83	6.83	-3.17	A,A	E,P
MW-216M2	4618227.98	369822.14	259.83	23.83	13.83	A,S	E,P
MW-216S	4618228.10	369822.27	259.83	60.83	50.83	A,T	E,P
MW-226M1	4618150.03	368726.85	164.18	-120.82	-130.82	A	P
MW-226M2	4618150.12	368726.94	164.18	-10.82	-20.82	A,T	E,P
MW-226M3	4618149.94	368726.84	164.18	29.18	19.18	S	P
MW-233M1	4618768.16	369178.96	249.94	-106.06	-116.06	A	P
MW-233M2	4618768.07	369178.96	249.94	-81.06	-91.06	S	P
MW-233M3	4618768.26	369178.87	250.55	19.55	9.55	A,A,A,A,T	E,SV,TM,P
MW-267M1	4618644.50	369615.78	286.26	38.26	28.26	A,T	E,P
MW-268M1	4618925.74	368480.44	98.52	1.52	-8.48	T	P
MW-269M1	4618369.50	369153.66	231.53	24.53	14.53	A	P
MW-269M2	4618369.00	369153.63	231.53	45.53	35.53	A	P
MW-276M1	4618055.50	369568.16	241.14	-6.86	-16.86	A	E

Table 2-1
Western Boundary - Groundwater Monitoring Well Network
October 2010 - September 2011

Well ID	Northing (utm)	Easting (utm)	Ground Elevation (ft-msl)	Screen Top Elevation (ft-msl)	Screen Bottom Elevation (ft-msl)	Sample Collection Frequency	Tested Parameters
MW-276M2	4618055.50	369568.13	241.14	7.14	-2.86	A,A	E,P
MW-276M3	4618059.00	369569.97	240.86	55.86	45.86	A,T	E,P
MW-280M1	4618919.00	369035.41	214.56	-40.44	-50.44	A	P
MW-280M2	4618918.50	369035.41	214.56	12.56	2.56	A	P
MW-280M3	4618916.00	369035.78	215.09	30.09	20.09	A	P
MW-282M1	4618826.50	369739.69	255.00	-55.00	-65.00	A	P
MW-282M2	4618826.50	369739.63	255.00	49.00	39.00	A	P
MW-80D	4618191.79	368354.68	94.37	-63.63	-73.63	A	E,V,SV,TM,P
MW-80M1	4618191.76	368355.69	94.37	-35.63	-45.63	A,A,A,A,T	E,V,SV,TM,P
MW-80M2	4618191.82	368354.69	94.47	-5.53	-15.53	A,A,A,A,T	E,V,SV,TM,P
MW-80M3	4618191.85	368354.69	94.47	24.47	14.47	A	E,V,SV,TM,P
MW-80S	4618190.78	368354.66	94.47	51.47	41.47	A	E,V,SV,TM,P
MW-82D	4617922.04	368320.00	77.97	-47.03	-57.03	A	E,V,SV,TM,P
MW-82M1	4617922.07	368320.00	77.97	-26.03	-36.03	A	E,V,SV,TM,P
MW-82M2	4617922.10	368320.00	77.67	-0.33	-10.33	A	E,V,SV,TM,P
MW-82M3	4617922.13	368320.00	77.97	23.97	13.97	A	E,V,SV,TM,P
MW-82S	4617922.16	368320.00	77.67	52.67	42.67	A	E,V,SV,TM,P
XXM972	4618504.43	367569.32	-	-	-	S	P
XXM975	4618135.49	367552.21	-	-	-	T	P

Notes:

utm = Universal Transverse Mercator
 ft-msl = Feet Above Mean Sea Level
 A = Annually
 Q = Quarterly
 S = Semi-Annually
 T = Tri-Annually
 E = Explosives
 P = Perchlorate
 SV = Semi-Volatile Organic Compounds
 V = Volatile Organic Compounds
 TM = TAL Metals
 - = Not available

Table 3-1

Western Boundary Perchlorate Results
October 2010 - September 2011

Well ID	Top of Screen (ft msl)	Bottom of Screen (ft msl)	Sampling Date	Groundwater Elevation (ft msl)	Method	Sample Type	Results (ug/L)	Flag	MDL	RL
00-1	-6.21	-12.21	12/13/10	-	SW6850	N	ND	U	0.040	0.20
			3/28/11	-	SW6850	N	ND	U	0.015	0.20
			8/9/11	-	SW6850	N	ND	U	0.015	0.20
4036000-01G	-38	-70	12/15/10	-	SW6850	N	ND	U	0.040	0.20
			3/22/11	-	SW6850	N	ND	U	0.015	0.20
			6/23/11	-	SW6850	N	ND	U	0.015	0.20
			9/20/11	-	SW6850	N	ND	U	0.015	0.20
			9/20/11	-	SW6850	FD	ND	U	0.015	0.20
4036000-03G	-50	-60	12/15/10	-	SW6850	N	ND	U	0.040	0.20
			3/22/11	-	SW6850	N	ND	U	0.015	0.20
			6/23/11	-	SW6850	N	ND	U	0.015	0.20
			9/20/11	-	SW6850	N	ND	U	0.015	0.20
4036000-04G	-55	-65	12/15/10	-	SW6850	N	ND	U	0.040	0.20
			3/22/11	-	SW6850	N	ND	U	0.015	0.20
			6/23/11	-	SW6850	N	ND	U	0.015	0.20
			9/20/11	-	SW6850	N	ND	U	0.015	0.20
4036000-06G	-108	-128	12/15/10	-	SW6850	N	ND	U	0.040	0.20
			3/22/11	-	SW6850	N	ND	U	0.015	0.20
			6/23/11	-	SW6850	N	ND	U	0.015	0.20
			9/20/11	-	SW6850	N	ND	U	0.015	0.20
97-2C	-53.01	-53.01	12/15/10	-	SW6850	N	0.25	J	0.040	0.20
			3/22/11	-	SW6850	N	ND	U	0.015	0.20
			8/5/11	-	SW6850	N	0.31		0.015	0.20
MW-02-01M1	-13.29	-23.29	12/10/10	35.22	SW6850	N	ND	U	0.040	0.20
			3/28/11	36.08	SW6850	N	ND	U	0.015	0.20
			8/5/11	34.91	SW6850	N	0.45		0.015	0.20
MW-02-01M2	-1.29	-11.29	12/10/10	35.15	SW6850	N	ND	U	0.040	0.20
			3/28/11	36.03	SW6850	N	ND	U	0.015	0.20
			8/5/11	34.84	SW6850	N	ND	U	0.015	0.20
MW-02-02M1	-33.6	-43.6	12/17/10	35.11	SW6850	N	0.20		0.040	0.20
			4/4/11	35.80	SW6850	N	0.20		0.015	0.20
			8/11/11	34.82	SW6850	N	0.20		0.015	0.20
MW-02-02M2	-13.6	-23.6	12/17/10	34.86	SW6850	N	0.23		0.040	0.20
			4/4/11	35.51	SW6850	N	0.20		0.015	0.20
			8/11/11	34.48	SW6850	N	ND	U	0.015	0.20

Table 3-1

Western Boundary Perchlorate Results
October 2010 - September 2011

Well ID	Top of Screen (ft msl)	Bottom of Screen (ft msl)	Sampling Date	Groundwater Elevation (ft msl)	Method	Sample Type	Results (ug/L)	Flag	MDL	RL
MW-02-02S	31.9	21.9	12/17/10	34.78	SW6850	N	0.49		0.040	0.20
			4/4/11	35.48	SW6850	N	ND	U	0.015	0.20
			8/11/11	34.53	SW6850	N	ND	U	0.015	0.20
MW-02-03M1	-57.25	-67.25	12/17/10	33.86	SW6850	N	0.22		0.040	0.20
			3/22/11	34.69	SW6850	N	ND	U	0.015	0.20
			8/11/11	33.57	SW6850	N	0.23		0.015	0.20
MW-02-03M2	-19.25	-29.25	12/17/10	33.88	SW6850	N	0.20		0.040	0.20
			3/22/11	34.71	SW6850	N	ND	U	0.015	0.20
			8/11/11	33.61	SW6850	N	0.21		0.015	0.20
MW-02-03M3	-2.25	-12.25	12/17/10	33.82	SW6850	N	0.21		0.040	0.20
			3/22/11	34.66	SW6850	N	ND	U	0.015	0.20
			8/11/11	33.52	SW6850	N	0.20		0.015	0.20
MW-02-04M1	-45.26	-55.26	12/13/10	33.55	SW6850	N	ND	U	0.040	0.20
			3/31/11	34.63	SW6850	N	0.38		0.015	0.20
			8/12/11	33.36	SW6850	N	0.24		0.015	0.20
			8/12/11	33.36	SW6850	FD	0.25		0.015	0.20
MW-02-04M2	-20.26	-30.26	12/13/10	33.56	SW6850	N	ND	U	0.040	0.20
			3/31/11	34.63	SW6850	N	ND	U	0.015	0.20
			8/12/11	33.39	SW6850	N	ND	U	0.015	0.20
MW-02-04M3	-5.26	-15.26	12/13/10	33.56	SW6850	N	ND	U	0.040	0.20
			3/31/11	34.64	SW6850	N	ND	U	0.015	0.20
			8/12/11	33.40	SW6850	N	ND	U	0.015	0.20
MW-02-05M1	-57.11	-67.11	12/15/10	27.85	SW6850	N	0.26	J	0.040	0.20
			3/28/11	28.47	SW6850	N	0.24		0.015	0.20
			8/10/11	27.49	SW6850	N	ND	U	0.015	0.20
MW-02-05M2	-39.11	-49.11	12/15/10	27.86	SW6850	N	0.22	J	0.040	0.20
			3/28/11	28.46	SW6850	N	ND	U	0.015	0.20
			8/10/11	27.39	SW6850	N	ND	U	0.015	0.20
MW-02-05M3	-17.11	-27.11	12/15/10	27.83	SW6850	N	ND	U	0.040	0.20
			3/28/11	28.42	SW6850	N	ND	U	0.015	0.20
			8/10/11	27.43	SW6850	N	ND	U	0.015	0.20
MW-02-07M3	21.27	11.27	12/13/10	40.25	SW6850	N	0.20		0.040	0.20
			3/23/11	40.75	SW6850	N	ND	U	0.015	0.20
			8/10/11	40.20	SW6850	N	0.24		0.015	0.20

Table 3-1

Western Boundary Perchlorate Results
October 2010 - September 2011

Well ID	Top of Screen (ft msl)	Bottom of Screen (ft msl)	Sampling Date	Groundwater Elevation (ft msl)	Method	Sample Type	Results (ug/L)	Flag	MDL	RL
MW-02-08M1	-51.94	-56.94	12/15/10	40.15	SW6850	N	ND	U	0.040	0.20
			4/4/11	40.64	SW6850	N	ND	U	0.015	0.20
			8/11/11	40.05	SW6850	N	ND	U	0.015	0.20
MW-02-08M2	-25.94	-30.94	12/15/10	40.17	SW6850	N	ND	U	0.040	0.20
			4/4/11	40.67	SW6850	N	ND	U	0.015	0.20
			8/11/11	40.08	SW6850	N	ND	U	0.015	0.20
MW-02-08M3	-5.94	-10.94	12/15/10	40.19	SW6850	N	ND	U	0.040	0.20
			4/4/11	40.70	SW6850	N	ND	U	0.015	0.20
			8/11/11	40.10	SW6850	N	ND	U	0.015	0.20
MW-02-09M1	-31.13	-41.13	12/13/10	39.58	SW6850	N	0.49		0.040	0.20
			12/13/10	39.58	SW6850	FD	0.50		0.040	0.20
			3/28/11	40.00	SW6850	N	0.43		0.015	0.20
			3/28/11	40.00	SW6850	FD	0.45		0.015	0.20
			8/10/11	39.48	SW6850	N	0.43		0.015	0.20
			8/10/11	39.48	SW6850	FD	0.42		0.015	0.20
MW-02-09M2	-16.13	-26.13	12/13/10	39.55	SW6850	N	0.24		0.040	0.20
			3/28/11	39.97	SW6850	N	0.25		0.015	0.20
			3/28/11	39.97	SW6850	FD	0.25		0.015	0.20
			8/10/11	39.44	SW6850	N	0.27		0.015	0.20
MW-02-09S	35.87	25.87	8/10/11	39.27	SW6850	N	ND	U	0.015	0.20
MW-02-12M1	-39.96	-49.96	12/10/10	22.18	SW6850	N	ND	U	0.040	0.20
			3/31/11	23.40	SW6850	N	0.22		0.015	0.20
			8/9/11	21.87	SW6850	N	0.20		0.015	0.20
MW-02-12M2	-24.96	-34.96	12/10/10	22.17	SW6850	N	ND	U	0.040	0.20
			3/31/11	23.40	SW6850	N	ND	U	0.015	0.20
			8/9/11	21.85	SW6850	N	ND	U	0.015	0.20
MW-02-12M3	-9.96	-19.96	12/10/10	22.16	SW6850	N	ND	U	0.040	0.20
			3/31/11	23.39	SW6850	N	ND	U	0.015	0.20
			8/9/11	21.84	SW6850	N	0.21		0.015	0.20
MW-02-13M1	-43.26	-53.26	12/10/10	19.11	SW6850	N	ND	U	0.040	0.20
			3/31/11	20.16	SW6850	N	ND	U	0.015	0.20
			8/9/11	18.51	SW6850	N	ND	U	0.015	0.20
MW-02-13M2	-28.26	-38.26	12/10/10	19.14	SW6850	N	0.22		0.040	0.20
			3/31/11	20.19	SW6850	N	0.28		0.015	0.20
			8/9/11	18.54	SW6850	N	0.26		0.015	0.20

Table 3-1

Western Boundary Perchlorate Results
October 2010 - September 2011

Well ID	Top of Screen (ft msl)	Bottom of Screen (ft msl)	Sampling Date	Groundwater Elevation (ft msl)	Method	Sample Type	Results (ug/L)	Flag	MDL	RL
MW-02-13M3	-13.26	-23.26	12/10/10	19.17	SW6850	N	0.22		0.040	0.20
			12/10/10	19.17	SW6850	FD	0.22		0.040	0.20
			3/31/11	20.23	SW6850	N	0.28		0.015	0.20
			8/9/11	18.61	SW6850	N	0.30		0.015	0.20
MW-02-15M1	-37.46	-47.46	8/12/11	40.59	SW6850	N	ND	U	0.015	0.20
MW-02-15M2	-13.46	-23.46	8/12/11	40.55	SW6850	N	ND	U	0.015	0.20
MW-02-15M3	6.54	-3.46	8/12/11	40.52	SW6850	N	0.24		0.015	0.20
MW-213M1	-38.47	-48.47	8/2/11	51.45	SW6850	N	0.20		0.015	0.20
MW-213M2	5.53	-4.47	12/14/10	51.76	SW6850	N	0.34		0.040	0.20
			12/14/10	51.76	SW6850	FD	0.34		0.040	0.20
			3/29/11	51.60	SW6850	N	0.34		0.015	0.20
			3/29/11	51.60	SW6850	FD	0.35		0.015	0.20
			8/2/11	51.75	SW6850	N	0.31		0.015	0.20
			8/2/11	51.75	SW6850	FD	0.33		0.015	0.20
MW-213M3	17.53	12.53	12/14/10	51.95	SW6850	N	0.27		0.040	0.20
			3/29/11	51.78	SW6850	N	0.27		0.015	0.20
			3/29/11	51.78	SW6850	FD	0.28		0.015	0.20
			8/2/11	51.96	SW6850	N	0.24		0.015	0.20
MW-216M1	6.83	-3.17	8/4/11	65.40	SW6850	N	ND	U	0.015	0.20
MW-216M2	23.83	13.83	4/1/11	64.85	SW6850	N	ND	U	0.015	0.20
			8/4/11	65.39	SW6850	N	ND	U	0.015	0.20
MW-216S	60.83	50.83	12/9/10	66.29	SW6850	N	ND	U	0.040	0.20
			4/1/11	64.84	SW6850	N	ND	U	0.015	0.20
			8/4/11	65.44	SW6850	N	ND	U	0.015	0.20
MW-226M1	-120.82	-130.82	8/3/11	57.01	SW6850	N	ND	U	0.015	0.20
MW-226M2	-10.82	-20.82	12/14/10	56.93	SW6850	N	ND	U	0.040	0.20
			3/30/11	56.30	SW6850	N	ND	U	0.015	0.20
			8/3/11	56.81	SW6850	N	0.21		0.015	0.20
MW-226M3	29.18	19.18	3/30/11	56.18	SW6850	N	ND	U	0.015	0.20
			8/3/11	56.66	SW6850	N	ND	U	0.015	0.20
MW-233M1	-106.06	-116.06	8/2/11	59.10	SW6850	N	ND	U	0.015	0.20

Table 3-1

Western Boundary Perchlorate Results
October 2010 - September 2011

Well ID	Top of Screen (ft msl)	Bottom of Screen (ft msl)	Sampling Date	Groundwater Elevation (ft msl)	Method	Sample Type	Results (ug/L)	Flag	MDL	RL
MW-233M2	-81.06	-91.06	3/29/11	58.35	SW6850	N	ND	U	0.015	0.20
			8/2/11	59.11	SW6850	N	ND	UJ	0.015	0.20
MW-233M3	19.55	9.55	12/14/10	59.89	SW6850	N	ND	U	0.040	0.20
			3/29/11	58.77	SW6850	N	ND	U	0.015	0.20
			8/2/11	59.49	SW6850	N	ND	U	0.015	0.20
MW-267M1	38.26	28.26	12/14/10	64.16	SW6850	N	ND	U	0.040	0.20
			3/29/11	62.72	SW6850	N	ND	U	0.015	0.20
			8/2/11	63.32	SW6850	N	ND	U	0.015	0.20
MW-268M1	1.52	-8.48	12/14/10	53.02	SW6850	N	ND	U	0.040	0.20
			3/30/11	52.62	SW6850	N	ND	U	0.015	0.20
			8/1/11	52.95	SW6850	N	ND	U	0.015	0.20
MW-269M1	24.53	14.53	8/3/11	51.35	SW6850	N	ND	U	0.015	0.20
MW-269M2	45.53	35.53	8/3/11	60.03	SW6850	N	ND	U	0.015	0.20
MW-276M2	7.14	-2.86	8/4/11	64.16	SW6850	N	ND	U	0.015	0.20
MW-276M3	55.86	45.86	12/9/10	64.77	SW6850	N	0.26		0.040	0.20
			3/29/11	63.41	SW6850	N	0.39		0.015	0.20
			8/4/11	64.17	SW6850	N	ND	U	0.015	0.20
			8/4/11	64.17	SW6850	FD	ND	U	0.015	0.20
MW-280M1	-40.44	-50.44	8/1/11	57.65	SW6850	N	ND	U	0.015	0.20
MW-280M2	12.56	2.56	8/1/11	58.48	SW6850	N	ND	U	0.015	0.20
MW-280M3	30.09	20.09	8/1/11	58.52	SW6850	N	ND	U	0.015	0.20
MW-282M1	-55	-65	8/5/11	63.53	SW6850	N	ND	U	0.015	0.20
MW-282M2	49	39	8/5/11	63.48	SW6850	N	9.2	R	0.015	0.20
MW-282M2	49	39	8/5/11 (re-analysis)	63.48	SW6850	N	0.032	J	0.015	0.20
MW-282M2	49	39	10/6/11 (re-sample)	63.27	SW6850	N	0.026	J	0.015	0.20
MW-80D	-47.03	-57.03	4/5/11	51.04	SW6850	N	ND	U	0.015	0.20
MW-80M1	-35.63	-45.63	12/14/10	50.94	SW6850	N	0.25		0.040	0.20
			4/5/11	50.91	SW6850	N	0.24		0.015	0.20
			8/3/11	50.97	SW6850	N	0.28		0.015	0.20

Table 3-1

Western Boundary Perchlorate Results
October 2010 - September 2011

Well ID	Top of Screen (ft msl)	Bottom of Screen (ft msl)	Sampling Date	Groundwater Elevation (ft msl)	Method	Sample Type	Results (ug/L)	Flag	MDL	RL
MW-80M2	-5.53	-15.53	12/14/10	50.95	SW6850	N	ND	U	0.040	0.20
			4/5/11	50.92	SW6850	N	ND	U	0.015	0.20
			8/3/11	50.97	SW6850	N	ND	U	0.015	0.20
MW-80M3	24.47	14.47	4/5/11	50.93	SW6850	N	ND	U	0.015	0.20
MW-80S	51.47	41.47	4/5/11	50.93	SW6850	N	ND	U	0.015	0.20
MW-82D	-47.03	-57.03	3/24/11	50.95	SW6850	N	ND	U	0.015	0.20
MW-82M1	-26.03	-36.03	3/24/11	51.31	SW6850	N	ND	U	0.015	0.20
MW-82M2	-0.33	-10.33	3/24/11	51.08	SW6850	N	ND	U	0.015	0.20
MW-82M3	23.97	13.97	3/24/11	51.12	SW6850	N	ND	U	0.015	0.20
MW-82S	52.67	42.67	3/24/11	51.44	SW6850	N	ND	U	0.015	0.20
XXM972	-	-	3/22/11	-	SW6850	N	ND	U	0.015	0.20
			8/8/11	-	SW6850	N	ND	U	0.015	0.20
XXM975	-	-	12/13/10	-	SW6850	N	0.47		0.040	0.20
			12/13/10	-	SW6850	FD	0.45		0.040	0.20
			3/28/11	-	SW6850	N	0.47		0.015	0.20
			3/28/11	-	SW6850	FD	0.50		0.015	0.20
			8/8/11	-	SW6850	N	0.48		0.015	0.20
			8/8/11	-	SW6850	FD	0.62		0.015	0.20

Notes:

ft msl = feet above mean sea level

ug/L = micrograms per liter

- = not available

J = estimated value

R = value rejected during data validation

ND = not detected

N = primary field sample

FD = field duplicate sample

Values exceeding MCP GW-1 are highlighted

Note: The original analysis of the sample collected from MW-282M2 indicated the presence of perchlorate at a concentration of 9.2 ug/L. Upon notification of the result, the Impact Area Groundwater Study Program (IAGWSP) requested that the laboratory re-analyze the original sample and that well MW-282M2 be re-sampled. The original container collected on 5 August 2011 was re-analyzed by the laboratory beyond the prescribed holding time and indicated an estimated result of 0.032 J ug/L, below the reporting limit of 0.20 ug/L. According to the revised laboratory report narrative, laboratory personnel indicated that the original result was due to cross-contamination from an extraordinarily high concentration sample from another project processed several weeks before the analysis of the 5 August 2011 sample collected from MW-282M2 (sample ID MW-282M2_T11). In addition, laboratory personnel indicated that the contamination was likely not coming from the instrument itself, but was possibly from a container used to prepare this specific sample. On 6 October 2011, well MW-282M2 was re-sampled and analyzed for perchlorate. The laboratory analytical results indicated a concentration of 0.026 J ug/L. As a result of these additional analyses, the original result (9.2 ug/L) was rejected during data validation.

Table 3-2

Western Boundary Explosives, Metals, VOCs, and SVOCs Results
October 2010 - September 2011

Well ID	Top of Screen (ft msl)	Bottom of Screen (ft msl)	Date Sampled	Groundwater Elevation (ft msl)	Analyte Group	Sample Type	Analyte	Test Method	Result (ug/L)	Flag Code	MDL	RL
4036000-01G	-38	-70	3/22/11	-	EXP	N	ND for 19 Analytes	SW8330	ND			
			6/23/11	-	EXP	N	ND for 19 Analytes	SW8330	ND			
			9/20/11	-	EXP	N	ND for 19 Analytes	SW8330	ND			
						FD	ND for 19 Analytes	SW8330	ND			
4036000-03G	-50	-60	3/22/11	-	EXP	N	ND for 19 Analytes	SW8330	ND			
			6/23/11	-	EXP	N	ND for 19 Analytes	SW8330	ND			
			9/20/11	-	EXP	N	ND for 19 Analytes	SW8330	ND			
4036000-04G	-55	-65	3/22/11	-	EXP	N	ND for 19 Analytes	SW8330	ND			
			6/23/11	-	EXP	N	ND for 19 Analytes	SW8330	ND			
			9/20/11	-	EXP	N	ND for 19 Analytes	SW8330	ND			
4036000-06G	-108	-128	3/22/11	-	EXP	N	ND for 19 Analytes	SW8330	ND			
			6/23/11	-	EXP	N	ND for 19 Analytes	SW8330	ND			
			9/20/11	-	EXP	N	ND for 19 Analytes	SW8330	ND			
MW-213M2	5.53	-4.47	3/29/11	51.60	METALS	N	ND for 19 Analytes	SW8330	ND			
							Calcium	SW6010B	2580	J	91.0	5000
							Cobalt	SW6010B	1.1	J	0.55	50.0
							Copper	SW6010B	2.0	J	1.4	25.0
							Magnesium	SW6010B	1570	J	84.0	5000
							Potassium	SW6010B	872	J	230	5000
							Sodium	SW6010B	7740		61.0	5000
					VOC	N	Chloroform	SW8260B	1.0		0.20	1.0
							Dibromomethane	SW8260B	0.15	J	0.14	1.0
							trans-1,3-Dichloropropene	SW8260B	0.19	J	0.16	1.0
					SVOC	N	ND for 78 Analytes	SW8270C	ND			

Table 3-2

Western Boundary Explosives, Metals, VOCs, and SVOCs Results
October 2010 - September 2011

Well ID	Top of Screen (ft msl)	Bottom of Screen (ft msl)	Date Sampled	Groundwater Elevation (ft msl)	Analyte Group	Sample Type	Analyte	Test Method	Result (ug/L)	Flag Code	MDL	RL
MW-213M3	17.53	12.53	3/29/11	51.78	EXP	N	ND for 19 Analytes	SW8330	ND			
					METALS	N	Calcium	SW6010B	2190	J	91.0	5000
							Magnesium	SW6010B	1400	J	84.0	5000
							Potassium	SW6010B	603	J	230	5000
							Sodium	SW6010B	7040		61.0	5000
					VOC	N	Chloroform	SW8260B	1.4		0.20	1.0
					SVOC	N	ND for 78 Analytes	SW8270C	ND			
MW-216M1	6.83	-3.17	4/1/11	64.88	EXP	N	ND for 19 Analytes	SW8330	ND			
MW-216M2	23.83	13.83	4/1/11	64.85	EXP	N	ND for 19 Analytes	SW8330	ND			
MW-216S	60.83	50.83	4/1/11	64.85	EXP	N	ND for 19 Analytes	SW8330	ND			
MW-226M2	-10.82	-20.82	3/30/11	56.30	EXP	N	ND for 19 Analytes	SW8330	ND			
MW-233M3	19.55	9.55	3/29/11	58.77	EXP	N	ND for 19 Analytes	SW8330	ND			
					METALS	N	Calcium	SW6010B	1660	J	91.0	5000
							Magnesium	SW6010B	1140	J	84.0	5000
							Potassium	SW6010B	541	J	230	5000
							Sodium	SW6010B	6810		61.0	5000
					VOC	N	Chloroform	SW8260B	1.3		0.20	1.0
					SVOC	N	ND for 78 Analytes	SW8270C	ND			
MW-267M1	38.26	28.26	3/29/11	62.72	EXP	N	ND for 19 Analytes	SW8330	ND			
MW-276M1	-53.86	-63.86	3/30/11	63.29	EXP	N	ND for 19 Analytes	SW8330	ND			
MW-276M2	7.14	-2.86	3/30/11	63.34	EXP	N	ND for 19 Analytes	SW8330	ND			
MW-276M3	55.86	45.86	3/30/11	63.41	EXP	N	ND for 19 Analytes	SW8330	ND			

Table 3-2

Western Boundary Explosives, Metals, VOCs, and SVOCs Results
October 2010 - September 2011

Well ID	Top of Screen (ft msl)	Bottom of Screen (ft msl)	Date Sampled	Groundwater Elevation (ft msl)	Analyte Group	Sample Type	Analyte	Test Method	Result (ug/L)	Flag Code	MDL	RL
MW-80D	-47.03	-57.03	4/5/11	51.04	METALS	N	ND for 19 Analytes	SW8330	ND			
							Boron	SW6010B	6.9	J	2.0	100
							Calcium	SW6010B	3220	J	91.0	5000
							Chromium, Total	SW6010B	1.0	J	0.82	10.0
							Iron	SW6010B	982		30.0	200
							Magnesium	SW6010B	1400	J	84.0	5000
							Manganese	SW6010B	13.7	J	0.36	15.0
							Nickel	SW6010B	2.8	J	0.96	40.0
							Potassium	SW6010B	871	J	230	5000
							Selenium	SW6010B	6.7	J	6.1	35.0
						FD	Sodium	SW6010B	7010		61.0	5000
							Zinc	SW6010B	5.0	J	3.6	20.0
							Boron	SW6010B	6.8	J	2.0	100
							Calcium	SW6010B	3020	J	91.0	5000
							Chromium, Total	SW6010B	0.95	J	0.82	10.0
							Iron	SW6010B	1010		30.0	200
							Magnesium	SW6010B	1330	J	84.0	5000
							Manganese	SW6010B	13.2	J	0.36	15.0
							Nickel	SW6010B	2.9	J	0.96	40.0
						VOC	Potassium	SW6010B	791	J	230	5000
							Sodium	SW6010B	6690		61.0	5000
							Zinc	SW6010B	4.7	J	3.6	20.0
							VOC	SW8260B	ND			
						SVOC	ND for 78 Analytes	SW8270C	ND			
MW-80M1	-35.63	-45.63	4/5/11	50.91	METALS	N	ND for 19 Analytes	SW8330	ND			
							Boron	SW6010B	7.8	J	91.0	5000
						N	Calcium	SW6010B	2330	J	84.0	5000
							Magnesium	SW6010B	1310	J	84.0	5000
							Potassium	SW6010B	644	J	230	5000
							Sodium	SW6010B	7850		61.0	5000
							VOC	SW8260B	0.84	J	0.20	1.0
							SVOC	SW8270C	ND			

Table 3-2

Western Boundary Explosives, Metals, VOCs, and SVOCs Results
October 2010 - September 2011

Well ID	Top of Screen (ft msl)	Bottom of Screen (ft msl)	Date Sampled	Groundwater Elevation (ft msl)	Analyte Group	Sample Type	Analyte	Test Method	Result (ug/L)	Flag Code	MDL	RL
MW-80M2	-5.53	-15.53	4/5/11	50.92	METALS	N	EXP	ND for 19 Analytes	SW8330	ND		
							Boron	SW6010B	7.5	J	2.0	100
							Calcium	SW6010B	2410	J	91.0	5000
							Magnesium	SW6010B	1480	J	84.0	5000
							Manganese	SW6010B	0.39	J	0.36	15.0
							Potassium	SW6010B	737	J	230	5000
							Sodium	SW6010B	8390		61.0	5000
					VOC	N	Chloroform	SW8260B	1.3		0.20	1.0
					SVOC	N	ND for 78 Analytes	SW8270C	ND			
MW-80M3	24.47	14.47	4/5/11	50.93	METALS	N	EXP	ND for 19 Analytes	SW8330	ND		
							Boron	SW6010B	9.4	J	2.0	100
							Calcium	SW6010B	1620	J	91.0	5000
							Magnesium	SW6010B	1160	J	84.0	5000
							Manganese	SW6010B	0.46	J	0.36	15.0
							Potassium	SW6010B	632	J	230	5000
							Sodium	SW6010B	6970		61.0	5000
					VOC	N	Chloroform	SW8260B	1.7		0.20	1.0
					SVOC	N	ND for 78 Analytes	SW8270C	ND			
MW-80S	51.47	41.47	4/5/11	50.93	METALS	N	EXP	ND for 19 Analytes	SW8330	ND		
							Barium	SW6010B	11.2	J	9.6	200
							Boron	SW6010B	8.3	J	2.0	100
							Calcium	SW6010B	1110	J	91.0	5000
							Copper	SW6010B	2.7	J	1.4	25.0
							Magnesium	SW6010B	1090	J	84.0	5000
							Manganese	SW6010B	8.5	J	0.36	15.0
					VOC	N	Chloroform	SW8260B	0.037	J	0.034	0.20
					SVOC	N	ND for 78 Analytes	SW8270C	645	J	230	5000

Table 3-2

Western Boundary Explosives, Metals, VOCs, and SVOCs Results
October 2010 - September 2011

Well ID	Top of Screen (ft msl)	Bottom of Screen (ft msl)	Date Sampled	Groundwater Elevation (ft msl)	Analyte Group	Sample Type	Analyte	Test Method	Result (ug/L)	Flag Code	MDL	RL	
MW-82D	-47.03	-57.03	3/24/11	50.95	METALS	N	EXP	ND for 19 Analytes	SW8330	ND			
							Boron	SW6010B	7.6	J	2.0	100	
							Calcium	SW6010B	3050	J	91.0	5000	
							Copper	SW6010B	1.5	J	1.4	25.0	
							Iron	SW6010B	54.0	J	30.0	200	
							Magnesium	SW6010B	1590	J	84.0	5000	
							Manganese	SW6010B	1.9	J	0.36	15.0	
							Potassium	SW6010B	760	J	230	5000	
							Sodium	SW6010B	7170		61.0	5000	
							Thallium	SW6010B	0.14	J	0.049	2.0	
MW-82M1	-26.03	-36.03	3/24/11	51.31	METALS	N	VOC	Chloroform	SW8260B	0.49	J	0.20	1.0
							SVOC	ND for 78 Analytes	SW8270C	ND			
							EXP	ND for 19 Analytes	SW8330	ND			
							Boron	SW6010B	62.1	J	45.0	200	
							Calcium	SW6010B	7.8	J	2.0	100	
							Iron	SW6010B	1260	J	91.0	5000	
							Lead	SW6010B	73.0	J	30.0	200	
							Magnesium	SW6010B	3.7	J	3.2	10.0	
							Manganese	SW6010B	1090	J	84.0	5000	
							Potassium	SW6010B	0.88	J	0.36	15.0	
MW-82M2	-0.33	-10.33	3/24/11	51.08	METALS	N	Sodium	SW6010B	643	J	230	5000	
							Thallium	SW6010B	6010		61.0	5000	
							VOC	Chloroform	SW8260B	0.063	J	0.049	2.0
							FD	Chloroform	SW8260B	1.5		0.20	1.0
							SVOC	ND for 78 Analytes	SW8270C	ND			
							EXP	ND for 19 Analytes	SW8330	ND			
							Boron	SW6010B	1.1	J	2.0	100	
							Calcium	SW6010B	1210	J	91.0	5000	
							Magnesium	SW6010B	1170	J	84.0	5000	
							Nickel	SW6010B	480	J	230	5000	
MW-82M3	-0.33	-10.33	3/24/11	51.08	METALS	N	Potassium	SW6010B	6210		61.0	5000	
							Sodium	SW6010B	0.050	J	0.049	2.0	
							Thallium	SW6010B	1.4		0.20	1.0	
							VOC	Chloroform	SW8260B	ND			
MW-82M4	-0.33	-10.33	3/24/11	51.08	METALS	N	SVOC	ND for 78 Analytes	SW8270C	ND			
							EXP	ND for 19 Analytes	SW8330	ND			
							Boron	SW6010B	0.88	J	0.36	15.0	
							Calcium	SW6010B	1.6		0.20	1.0	

Table 3-2

Western Boundary Explosives, Metals, VOCs, and SVOCs Results
October 2010 - September 2011

Well ID	Top of Screen (ft msl)	Bottom of Screen (ft msl)	Date Sampled	Groundwater Elevation (ft msl)	Analyte Group	Sample Type	Analyte	Test Method	Result (ug/L)	Flag Code	MDL	RL
MW-82M3	23.97	13.97	3/24/11	51.12	METALS	N	EXP	ND for 19 Analytes	SW8330	ND		
							Boron	SW6010B	7.6	J	2.0	100
							Calcium	SW6010B	1620	J	91.0	5000
							Magnesium	SW6010B	1190	J	84.0	5000
							Manganese	SW6010B	0.44	J	0.36	15.0
					VOC	N	Potassium	SW6010B	580	J	230	5000
							Sodium	SW6010B	6870		61.0	5000
							Chloroform	SW8260B	1.5		0.20	1.0
					SVOC	N	ND for 78 Analytes	SW8270C	ND			
MW-82S	52.67	42.67	3/24/11	51.44	METALS	N	EXP	ND for 19 Analytes	SW8330	ND		
							Barium	SW6010B	16.8	J	9.6	200
							Boron	SW6010B	7.0	J	2.0	100
							Calcium	SW6010B	1690	J	91.0	5000
							Magnesium	SW6010B	1160	J	84.0	5000
					VOC	N	Manganese	SW6010B	13.0	J	0.36	15.0
							Potassium	SW6010B	556	J	230	5000
							Sodium	SW6010B	5200		61.0	5000
					SVOC	N	Chloroform	SW8260B	1.8		0.20	1.0
							ND for 78 Analytes	SW8270C	ND			

NOTES:

ft msl = feet above mean sea level

ND = not detected

ug/L = micrograms per liter

EXP = explosives compounds

MDL = method detection limit

METALS = total metals

RL = laboratory reporting limit

VOCs = volatile organic compounds

N = primary field sample

SVOCs = semi-volatile organic compounds

FD = field duplicate sample

- = not available

J = estimated concentration

Highlighted analytes exceed one or more Western Boundary site-wide groundwater screening values

Table 3-3

**Western Boundary - Groundwater Screening Criteria
Analytes Detected During the 2010-2011 Reporting Period**

Analyte Group	Detected Analyte	Maximum Concentration Detected (ug/L)	Location of Maximum Concentration	Screening Values (ug/L)			
				Federal Maximum Contaminant Level	EPA Lifetime HA for Drinking Water	EPA Regional Screening Level for Tap Water	Massachusetts Contingency Plan GW-1
Perchlorate	Perchlorate	0.62	XXM975	-	15	26	2
Metals	Aluminum	111 J	MW-80S	-	-	37,000	-
	Barium	16.8 J	MW-82S	2,000	-	7,300	2,000
	Boron	9.4 J	MW-80M3	-	1,000	7,300	-
	Calcium	3,220 J	MW-80D	-	-	-	-
	Chromuim, Total	1.0 J	MW-80D	100	-	-	100
	Cobalt	1.1 J	MW-213M2	-	-	11	-
	Copper	2.7 J	MW-80S	1300 ¹	-	1,500	-
	Iron	1,010	MW-80D	-	-	26,000	-
	Lead	3.7 J	MW-82M1	15 ¹	-	-	15
	Magnesium	1,590 J	MW-82D	-	-	-	-
	Manganese	13.7 J	MW-80D	-	300	880	-
	Mercury	0.037J	MW-80S	2	2	-	2
	Nickel	2.9 J	MW-80D	-	100	730	100
	Potassium	872 J	MW-213M2	-	-	-	-
	Selenium	6.7 J	MW-80D	50	50	180	50
	Sodium	8,390	MW-80M2	-	-	-	-
	Thallium	0.14 J	MW-82D	2	-	0.37	2
	Zinc	5.0 J	MW-82M3	-	2,000	11,000	5,000
Volatile Organic Compounds	Chloroform	1.8	MW-82S	80	70	0.19	70
	Dibromomethane	0.15 J	MW-213M2	-	-	8.2	-
	trans-1,3-Dichloropropene	0.19 J	MW-213M2	-	-	0.43	0.4

Notes:

ug/L - micrograms per liter

J - estimated concentration

HA - Health Advisory

1 = Action Level

Table 4-1
Western Boundary
Proposed Changes to Groundwater Monitoring Well Network and Sampling Schedule

Well ID	Screen Top Elevation (ft-msl)	Screen Bottom Elevation (ft-msl)	Historical Maximum Perchlorate Detection (ug/L)	Date of Historical Maximum	Most Recent Perchlorate Detection (ug/L)	Date of Most Recent Detection	Notes	Proposed Monitoring Network Status	Proposed Sampling Frequency
00-1	-6.21	-12.21	0.442J	1/29/2003	0.060J	8/4/2010	Located in the downgradient portion of the Monument Beach Well Field. Perchlorate detected in 9 of the 34 samples collected since 2002; none exceed the MMCL. No detections during 2011 reporting period.	Not Retained	
4036000-01G	-	-	0.54J	12/18/2008	0.18J	9/24/2010	In-use water supply well. Perchlorate detected in 10 of 197 samples collected since 2001; none exceed the MMCL.	Retained	Quarterly
4036000-03G	-	-	0.59J	10/29/2002	0.17J	9/24/2010	In-use water supply well. Perchlorate detected in 18 of 111 samples collected since 2001; none exceed the MMCL.	Retained	Quarterly
4036000-04G	-	-	0.74J	4/24/2002	0.18J	9/24/2010	In-use water supply well. Perchlorate detected in 13 of 156 samples collected since 2001; none exceed the MMCL.	Retained	Quarterly
4036000-06G	-	-	0.53J	5/17/2006	0.18J	9/24/2010	In-use water supply well - perchlorate detected in 13 of 193 samples collected since 2001 - none exceed the MMCL.	Retained	Quarterly
97-2C			0.733J	10/15/2004	0.31	8/5/2011	Located in close proximity to 4036000-06G. Perchlorate detected in 21 of 51 samples collected since 2002; none exceed the MMCL.	Not Retained	
MW-02-01M1	-13.29	-23.29	0.56J	7/27/2002	0.45	8/5/2011	Monument Beach Well Field well site upgradient of 4036000-03G. Pechlorate detected in 10 of 40 samples collected since 2002; none exceed the MMCL.	Not Retained	
MW-02-01M2	-1.29	-11.29	0.64J	7/27/2002	0.12J	8/4/2010	Monument Beach Well Field well site upgradient of 4036000-03G. Pechlorate detected in 12 of 44 samples collected since 2002; none exceed the MMCL.	Not Retained	
MW-02-02M1	-33.6	-43.6	0.74J	8/3/2002	0.20	8/11/2011	Monument Beach Well Field well site upgradient of 4036000-03G. Pechlorate detected in 15 of 39 samples collected since 2002; none exceed the MMCL.	Not Retained	
MW-02-02M2	-13.6	-23.6	0.52J	8/3/2002	0.20	4/4/2011	Monument Beach Well Field well site upgradient of 4036000-03G. Pechlorate detected in 22 of 48 samples collected since 2002; none exceed the MMCL.	Not Retained	
MW-02-02S	31.9	21.9	0.44J	9/7/2002	0.49	12/17/2010	Monument Beach Well Field well site upgradient of 4036000-03G. Pechlorate detected in 9 of 38 samples collected since 2002; none exceed the MMCL.	Not Retained	
MW-02-03M1	-57.25	-67.25	0.85J	5/27/2005	0.23	8/11/2011	Monument Beach Well Field well site upgradient of 4036000-04G. Pechlorate detected in 14 of 54 samples collected since 2002; none above the MMCL.	Not Retained	
MW-02-03M2	-19.25	-29.25	0.54J	7/27/2002	0.21	8/11/2011	Monument Beach Well Field well site upgradient of 4036000-04G. Pechlorate detected in 21 of 51 samples collected since 2002; none exceed the MMCL.	Not Retained	
MW-02-03M3	-2.25	-12.25	0.66J	7/27/2002	0.20	8/11/2011	Monument Beach Well Field well site upgradient of 4036000-04G. Pechlorate detected in 14 of 50 samples collected since 2002; none exceed the MMCL.	Not Retained	
MW-02-04M1	-45.26	-55.26	0.61J	4/29/2002	0.25	8/12/2011	Monument Beach Well Field well site upgradient of 4036000-04G. Pechlorate detected in 25 of 54 samples collected since 2002; none exceed the MMCL.	Retained	Annual
MW-02-04M2	-20.26	-30.26	0.081J	8/2/2010	0.081J	8/2/2010	Monument Beach Well Field well site upgradient of 4036000-04G. Pechlorate detected in 3 of 51 samples collected since 2002; none exceed the MMCL.	Not Retained	

Table 4-1
Western Boundary
Proposed Changes to Groundwater Monitoring Well Network and Sampling Schedule

Well ID	Screen Top Elevation (ft-msl)	Screen Bottom Elevation (ft-msl)	Historical Maximum Perchlorate Detection (ug/L)	Date of Historical Maximum	Most Recent Perchlorate Detection (ug/L)	Date of Most Recent Detection	Notes	Proposed Monitoring Network Status	Proposed Sampling Frequency
MW-02-04M3	-5.26	-15.26	0.074J	12/3/2010	0.063J	8/2/2010	Monument Beach Well Field well site upgradient of 4036000-04G. Pechlorate detected in 3 of 52 samples collected since 2002; none exceed the MMCL.	Not Retained	
MW-02-05M1	-57.11	-67.11	0.63J	3/18/2004	0.24	3/28/2011	Monument Beach Well Field well site upgradient of 4036000-06G. Pechlorate detected in 47 of 51 samples collected since 2002; none exceed the MMCL.	Retained	Annual
MW-02-05M2	-39.11	-49.11	0.78J	8/24/2002	0.22J	12/15/2010	Monument Beach Well Field well site upgradient of 4036000-06G. Pechlorate detected in 48 of 58 samples collected since 2002; none exceed the MMCL.	Retained	Annual
MW-02-05M3	-17.11	-27.11	0.55J	6/3/2004	0.13J	8/10/2010	Monument Beach Well Field well site upgradient of 4036000-06G. Pechlorate detected in 26 of 50 samples collected since 2002; none exceed the MMCL.	Retained	Annual
MW-02-07M3	21.27	11.27	0.47J	9/30/2002	0.24	8/10/2011	Located in the upgradient portion of the Monument Beach Well Field. Pechlorate detected in 16 of 41 samples collected since 2002; none exceed the MMCL.	Retained	Annual
MW-02-08M1	-51.94	-56.94	ND	-	ND	-	Located in the upgradient portion of the Monument Beach Well Field. Pechlorate has not been detected in 39 samples collected from this well since 2002.	Not Retained	
MW-02-08M2	-25.94	-30.94	0.57J	8/28/2002	0.20	8/3/2010	Located in the upgradient portion of the Monument Beach Well Field. Pechlorate detected in 12 of 40 samples collected since 2002; none exceed the MMCL.	Retained	Annual
MW-02-08M3	-5.94	-10.94	0.62J	10/31/2002	0.18J	8/3/2010	Located in the upgradient portion of the Monument Beach Well Field - perchlorate detected in 21 of 44 samples collected since 2002 - none exceed the MMCL	Retained	Annual
MW-02-09M1	-31.13	-41.13	0.58J	10/21/2003	0.43	8/10/2011	Located in the upgradient portion of the Monument Beach Well Field. Pechlorate detected in 39 of 52 samples collected since 2002; none exceed the MMCL.	Retained	Annual
MW-02-09M2	-16.13	-26.13	0.73J	10/21/2003	0.27	8/10/2011	Located in the upgradient portion of the Monument Beach Well Field. Pechlorate detected in 37 of 45 samples collected since 2002; none exceed the MMCL.	Retained	Annual
MW-02-09S	35.87	25.87	0.10J	8/9/2010	0.10J	8/9/2010	Located in the upgradient portion of the Monument Beach Well Field. Pechlorate detected in 2 of 35 samples collected from this well since 2002; none exceed the MMCL.	Not Retained	
MW-02-12M1	-39.96	-49.96	0.48J	7/1/2003	0.20	8/9/2011	Centrally located within the Monument Beach Well Field. Pechlorate detected in 9 of 105 samples collected since 2002; none exceed the MMCL.	Not Retained	
MW-02-12M2	-24.96	-34.96	0.43J	8/29/2002	0.14J	8/5/2010	Centrally located within the Monument Beach Well Field. Pechlorate detected in 7 of 93 samples collected since 2002; none exceed the MMCL.	Not Retained	
MW-02-12M3	-9.96	-19.96	0.62J	9/11/2002	0.21	8/9/2011	Centrally located within the Monument Beach Well Field. Pechlorate detected in 11 of 101 samples collected since 2002; none exceed the MMCL.	Not Retained	
MW-02-13M1	-43.26	-53.26	0.66J	6/12/2002	0.13J	8/5/2010	Centrally located within the Monument Beach Well Field. Pechlorate detected in 37 of 142 samples collected since 2002; none exceed the MMCL.	Retained	Annual
MW-02-13M2	-28.26	-38.26	0.97J	4/27/2002	0.26	8/9/2011	Centrally located within the Monument Beach Well Field. Pechlorate detected in 54 of 153 samples collected since 2002; none exceed the MMCL.	Retained	Annual

Table 4-1
Western Boundary
Proposed Changes to Groundwater Monitoring Well Network and Sampling Schedule

Well ID	Screen Top Elevation (ft-msl)	Screen Bottom Elevation (ft-msl)	Historical Maximum Perchlorate Detection (ug/L)	Date of Historical Maximum	Most Recent Perchlorate Detection (ug/L)	Date of Most Recent Detection	Notes	Proposed Monitoring Network Status	Proposed Sampling Frequency
MW-02-13M3	-13.26	-23.26	0.63J	8/6/2002	0.30	8/9/2011	Centrally located within the Monument Beach Well Field. Perchlorate detected in 33 of 150 samples collected since 2002; none exceed the MMCL.	Retained	Annual
MW-02-15M1	-37.46	-47.46	0.047J	8/9/2010	0.047J	8/9/2010	Upgradient Monument Beach Well Field well site. Perchlorate detected in 1 of 34 samples collected from this well since 2002; concentration did not exceed the MMCL.	Retained	Annual
MW-02-15M2	-13.46	-23.46	0.61J	8/5/2002	0.047J	8/9/2010	Upgradient Monument Beach Well Field well site. Perchlorate detected in 2 of 36 samples collected since 2002; none exceed the MMCL.	Retained	Annual
MW-02-15M3	6.54	-3.46	0.24	8/12/2011	0.24	8/12/2011	Upgradient Monument Beach Well Field well site. Perchlorate detected in 2 of 37 samples collected from this well since 2002; none exceed the MMCL.	Not Retained	
MW-213M1	-38.47	-48.47	0.20	8/2/2011	0.20	8/2/2011	Located on the Camp Edwards boundary. Perchlorate detected in 3 of 32 samples collected from this well since 2002; none exceed the MMCL.	Not Retained	
MW-213M2	5.53	-4.47	1.1	10/22/2003	0.31	8/2/2011	Located on the Camp Edwards boundary. Perchlorate detected in 44 of 45 samples collected from this well since 2002; none exceed the MMCL.	Retained	Annual
MW-213M3	17.53	12.53	1.4	6/8/2002	0.24	8/2/2011	Located on the Camp Edwards boundary. Perchlorate detected in 47 of 48 samples collected from this well since 2002; none exceed the MMCL.	Retained	Annual
MW-216M1	6.83	-3.17	0.69J	4/5/2004	0.040J	8/17/2010	Upgradient Western Boundary well site. Perchlorate detected in 2 of 20 samples collected from this well since 2002; none exceed the MMCL.	Not Retained	
MW-216M2	23.83	13.83	ND	-	ND	-	Upgradient Western Boundary well site. Perchlorate has not been detected in the 25 samples collected from this well since 2002.	Not Retained	
MW-216S	60.83	50.83	1.2	8/30/2004	0.25	8/17/2010	Upgradient Western Boundary well site. Perchlorate detected in 23 of 28 samples collected from this well since 2002; none exceed the MMCL.	Not Retained	
MW-226M1	-120.82	-130.82	ND	-	ND	-	Centrally located well site within the Western Boundary study area. Perchlorate has not been detected in the 19 samples collected from this well since 2002.	Not Retained	
MW-226M2	-10.82	-20.82	1.5	12/19/2002	0.21	8/3/2011	Centrally located well site within the Western Boundary study area. Perchlorate detected in 23 of 27 samples collected from this well since 2002; none exceed the MMCL.	Retained	Annual
MW-226M3	29.18	19.18	0.81J	5/16/2006	0.074J	8/16/2010	Centrally located well site within the Western Boundary study area - perchlorate detected in 11 of 25 samples collected from this well since 2002 - none exceed the MMCL	Not Retained	
MW-233M1	-106.06	-116.06	ND	-	ND	-	Located in the north-central portion of the Western Boundary study area. Perchlorate has not been detected in the 18 samples collected from this well since 2002.	Not Retained	
MW-233M2	-81.06	-91.06	ND	-	ND	-	Located in the north-central portion of the Western Boundary study area. Perchlorate has not been detected in the 22 samples collected from this well since 2002.	Not Retained	
MW-233M3	19.55	9.55	2.8	5/16/2006	0.096J	8/16/2010	Located in the north-central portion of the Western Boundary study area. Perchlorate detected in 31 of 34 samples collected from this well since 2002; six of the reported concentrations were equal to or greater than the 2 ug/L MMCL.	Retained	Annual
MW-267M1	38.26	28.26	2.9	5/30/2003	0.15J	8/11/2010	Western Boundary well located upgradient of the MW-233 well site. Perchlorate detected in 11 of 21 samples collected from this well since 2003; the two samples collected in 2003 exceeded the 2 ug/L MMCL.	Not Retained	

Table 4-1
Western Boundary
Proposed Changes to Groundwater Monitoring Well Network and Sampling Schedule

Well ID	Screen Top Elevation (ft-msl)	Screen Bottom Elevation (ft-msl)	Historical Maximum Perchlorate Detection (ug/L)	Date of Historical Maximum	Most Recent Perchlorate Detection (ug/L)	Date of Most Recent Detection	Notes	Proposed Monitoring Network Status	Proposed Sampling Frequency
MW-268M1	1.52	-8.48	0.065J	4/8/2009	0.058J	8/10/2010	Western Boundary well located downgradient of the MW-233 well site. Perchlorate detected in 3 of 27 samples collected from this well since 2003; none exceed the MMCL.	Retained	Annual
MW-269M1	24.53	14.53	0.38J	4/6/2004	0.068J	8/16/2010	Centrally located well site within the Western Boundary study area. Perchlorate detected in 3 of 12 samples collected from this well since 2003; none exceed the MMCL.	Retained	Annual
MW-269M2	45.53	35.53	0.065J	8/16/2010	0.065J	8/16/2010	Centrally located well site within the Western Boundary study area. Perchlorate detected in 2 of 16 samples collected from this well since 2003; none exceed the MMCL.	Not Retained	
MW-276M1	-6.86	-16.86	ND	-	ND	-	Upgradient Western Boundary well site. Perchlorate has not been detected in the 10 samples collected from this well since 2003 (not sampled for perchlorate since 2005).	Not Retained	
MW-276M2	7.14	-2.86	0.045J	8/16/2010	0.045J	8/16/2010	Upgradient Western Boundary well site. Perchlorate detected in 1 of 14 samples collected from this well since 2003; the concentration did not exceed the MMCL.	Not Retained	
MW-276M3	55.86	45.86	1.9	3/18/2004	0.39	3/29/2011	Upgradient Western Boundary well site. Perchlorate detected in 16 of 24 samples collected from this well since 2003; none exceed the MMCL.	Retained	Annual
MW-280M1	-40.44	-50.44	0.15J	8/3/2009	0.095J	8/11/2010	Western Boundary well located downgradient of the MW-233 well site. Perchlorate detected in 2 of 14 samples collected from this well since 2003; none exceed the MMCL.	Retained	Annual
MW-280M2	12.56	2.56	0.050J	8/11/2010	0.050J	8/11/2010	Western Boundary well located downgradient of the MW-233 well site. Perchlorate detected in 1 of 13 samples collected from this well since 2003; the concentration did not exceed the MMCL.	Retained	Annual
MW-280M3	30.09	20.09	0.072J	8/11/2010	0.072J	8/11/2010	Western Boundary well located downgradient of the MW-233 well site. Perchlorate detected in 2 of 15 samples collected from this well since 2003; none exceed the MMCL.	Retained	Annual
MW-282M1	-55	-65	0.052J	8/10/2010	0.052J	8/10/2010	Western Boundary well located upgradient of the MW-233 well site. Perchlorate detected in 1 of 11 samples collected from this well since 2003; the concentration did not exceed the MMCL.	Not Retained	
MW-282M2	49	39	0.043J	8/10/2010	0.026J	10/6/2011	Western Boundary well located upgradient of the MW-233 well site. Perchlorate detected in 2 of 14 samples collected from this well since 2003; none exceed the MMCL.	Not Retained	
MW-80D	-63.63	-73.63	ND	-	ND	-	Located on the Camp Edwards boundary. Perchlorate has not been detected in the 36 samples collected from this well since 2000.	Not Retained	
MW-80M1	-35.63	-45.63	2.3	4/4/2002	0.28	8/3/2011	Located on the Camp Edwards boundary. Perchlorate detected in 47 of 50 samples collected from this well since 2000; one reported concentration exceeded the 2 ug/L MMCL.	Retained	Annual
MW-80M2	-5.53	-15.53	0.97J	3/27/2002	0.059J	8/11/2010	Located on the Camp Edwards boundary. Perchlorate detected in 34 of 45 samples collected from this well since 2000; none exceed the MMCL.	Retained	Annual
MW-80M3	24.47	14.47	0.54J	6/9/2002	0.041J	4/9/2009	Located on the Camp Edwards boundary. Perchlorate detected in 2 of 43 samples collected from this well since 2000; none exceed the MMCL.	Not Retained	
MW-80S	51.47	41.47	0.90J	3/27/2002	0.052J	4/9/2009	Located on the Camp Edwards boundary. Perchlorate detected in 2 of 36 samples collected from this well since 2000; none exceed the MMCL.	Not Retained	

Table 4-1
Western Boundary
Proposed Changes to Groundwater Monitoring Well Network and Sampling Schedule

Well ID	Screen Top Elevation (ft-msl)	Screen Bottom Elevation (ft-msl)	Historical Maximum Perchlorate Detection (ug/L)	Date of Historical Maximum	Most Recent Perchlorate Detection (ug/L)	Date of Most Recent Detection	Notes	Proposed Monitoring Network Status	Proposed Sampling Frequency
MW-82D	-47.03	-57.03	0.047J	3/30/2009	0.047J	3/30/2009	Located on the Camp Edwards boundary. Perchlorate detected in 1 of 36 samples collected from this well since 2000; the concentration did not exceed the MMCL.	Not Retained	
MW-82M1	-26.03	-36.03	0.042J	3/30/2009	0.042J	3/30/2009	Located on the Camp Edwards boundary. Perchlorate detected in 1 of 39 samples collected from this well since 2000; the concentration did not exceed the MMCL.	Not Retained	
MW-82M2	-0.33	-10.33	0.053J	3/30/2009	0.053J	3/30/2009	Located on the Camp Edwards boundary. Perchlorate detected in 1 of 42 samples collected from this well since 2000; the concentration did not exceed the MMCL.	Not Retained	
MW-82M3	23.97	13.97	ND	-	ND	-	Located on the Camp Edwards boundary. Perchlorate has not been detected in the 45 samples collected from this well since 2000.	Not Retained	
MW-82S	52.67	42.67	0.045J	3/30/2009	0.045J	3/30/2009	Located on the Camp Edwards boundary. Perchlorate detected in 1 of 35 samples collected from this well since 2000; the concentration did not exceed the MMCL.	Not Retained	
XXM972	-	-	0.74J	3/26/2002	0.20	8/5/2010	Located in the upgradient portion of the Monument Beach Well Field near the MW-02-07 well site. Pechlorate detected in 18 of 46 samples collected from this well since 2001; none exceed the MMCL.	Not Retained	
XXM975	-	-	0.80J	2/25/2002	0.62	8/8/2011	Located in the upgradient portion of the Monument Beach Well Field near the MW-02-09 well site. Pechlorate detected in 54 of 63 samples collected from this well since 2001; none exceed the MMCL.	Not Retained	

Notes:

ug/L = micrograms per liter

J = estimated value

- = not available

ND = not detected

Number of samples includes duplicates/quality assurance samples

Wells retained for optimized network noted in bold

Table 4-2
Western Boundary
Proposed Groundwater Monitoring Well Network

Well ID	Northing (utm)	Easting (utm)	Ground Elevation (ft msl)	Screen Top Elevation (ft msl)	Screen Bottom Elevation (ft msl)	Analysis	Sample Collection Frequency	Rationale
4036000-01G	4618217.21	366248.29	-	-	-	P	Q	
4036000-03G	4618381.83	367191.80	-	-	-	P	Q	
4036000-04G	4618697.41	367080.81	-	-	-	P	Q	
4036000-06G	4617941.90	366812.80	-	-	-	P	Q	
MW-02-04M1	4618780.52	367277.62	77.74	-45.26	-55.26	P	A	Measure perchlorate concentrations immediatey upgradient of the Monument Beach Well Field.
MW-02-05M1	4618058.32	366978.59	52.89	-57.11	-67.11	P	A	Monitor concentrations within the Monument Beach Well Field
MW-02-05M2	4618058.44	366978.75	52.89	-39.11	-49.11	P	A	where perchlorate has been historically detected at low
MW-02-05M3	4618058.56	366978.84	52.89	-17.11	-27.11	P	A	concentrations.
MW-02-07M3	4618488.98	367615.25	68.27	21.27	11.27	P	A	Measure perchlorate concentrations immediatey upgradient of the Monument Beach Well Field.
MW-02-08M2	4618319.93	367635.29	56.06	-25.94	-30.94	P	A	Measure perchlorate concentrations immediatey upgradient of
MW-02-08M3	4618320.05	367635.38	56.06	-5.94	-10.94	P	A	the Monument Beach Well Field.
MW-02-09M1	4618193.90	367625.46	42.87	-31.13	-41.13	P	A	Measure perchlorate concentrations immediatey upgradient of
MW-02-09M2	4618194.02	367625.59	42.87	-16.13	-26.13	P	A	the Monument Beach Well Field.
MW-02-13M1	4618193.80	366568.28	54.74	-43.26	-53.26	P	A	Monitor concentrations within the Monument Beach Well Field
MW-02-13M2	4618193.92	366568.37	54.74	-28.26	-38.26	P	A	where perchlorate has been historically detected at low
MW-02-13M3	4618194.04	366568.50	54.74	-13.26	-23.26	P	A	concentrations.
MW-02-15M1	4617903.68	367771.64	87.54	-37.46	-47.46	P	A	Measure perchlorate concentrations immediatey upgradient of
MW-02-15M2	4617903.80	367771.79	87.54	-13.46	-23.46	P	A	the Monument Beach Well Field.
MW-213M2	4618444.95	368400.66	94.53	5.53	-4.47	P	A	Track perchlorate concentrations crossing the Camp Edwards installation boundary upgradient of the Monument Beach Well Field.
MW-213M3	4618445.07	368400.78	94.53	17.53	12.53	P	A	
MW-226M2	4618150.12	368726.94	164.18	-10.82	-20.82	P	A	Confirm the continued declining trend in upgradient perchlorate concentrations.
MW-233M3	4618768.26	369178.87	250.55	19.55	9.55	P	A	Monitor changes in the distribution of perchlorate in the northern portions of the study area.

Table 4-2
Western Boundary
Proposed Groundwater Monitoring Well Network

Well ID	Northing (utm)	Easting (utm)	Ground Elevation (ft msl)	Screen Top Elevation (ft msl)	Screen Bottom Elevation (ft msl)	Analysis	Sample Collection Frequency	Rationale
MW-268M1	4618925.74	368480.44	98.52	1.52	-8.48	P	A	Track perchlorate concentrations crossing the Camp Edwards installation boundary upgradient of the Monument Beach Well Field.
MW-269M1	4618369.50	369153.66	231.53	24.53	14.53	P	A	Confirm the continued declining trend in upgradient perchlorate concentrations.
MW-276M3	4618059.00	369569.97	240.86	55.86	45.86	P	A	Confirm the continued declining trend in upgradient perchlorate concentrations.
MW-280M1	4618919.00	369035.41	214.56	-40.44	-50.44	P	A	Monitor changes in the distribution of perchlorate in the northern portions of the study area.
MW-280M2	4618918.50	369035.41	214.56	12.56	2.56	P	A	
MW-280M3	4618916.00	369035.78	215.09	30.09	20.09	P	A	
MW-80M1	4618191.76	368355.69	94.37	-35.63	-45.63	P	A	Track perchlorate concentrations crossing the Camp Edwards installation boundary upgradient of the Monument Beach Well Field.
MW-80M2	4618191.82	368354.69	94.47	-5.53	-15.53	P	A	

Notes:

utm = Universal Transverse Mercator

ft msl = Feet Above Mean Sea Level

- = Not available

P = Perchlorate analyzed by Method SW846/6850

Q = Quarterly

A = Annually

APPENDIX A

PROJECT NOTE

Client, Project and Location:

Impact Area Groundwater Study Program
Western Boundary
Camp Edwards, MA

Subject: Optimization of Western Boundary Chemical Monitoring Plan

Date: July 16, 2012

PURPOSE

On June 14, 2012, the Army National Guard's Impact Area Groundwater Study Program (IAGWSP) submitted a Response to Comments Letter (RCL) on the Draft Western Boundary Interim Environmental Monitoring Report – October 2010 through September 2011, dated January 2012. The RCL addressed comments that were received from the Massachusetts Department of Environmental Protection (MassDEP) in a letter dated May 14, 2011, and from the U.S. Environmental Protection Agency (USEPA) in a letter dated May 23, 2012. USEPA and MassDEP approved the recommended changes to the monitoring network and sampling parameters, as amended per requests by the Bourne Water District (BWD) to maintain quarterly monitoring of BWD production wells 40360000-01G, 40360000-03G, 40360000-04G, and 40360000-06G and retain annual monitoring of MW02-13M1, MW02-13M2, and MW02-13M3. The modifications to the monitoring plan include eliminating future sampling at 42 monitoring wells and reduction of analytical parameters for all remaining samples to perchlorate only.

This Project Note (PN) documents agency concurrence with the changes to the chemical monitoring plan for the Western Boundary, as proposed in the draft report and modified based on agency comments. The attached table presents the approved chemical monitoring network.

CONCURRENCE

Concurrence with the agreements presented in this project note is represented by the signatures below:

Roland L. 7/16/2012
USEPA Representative

B.P. 7/17/2012
MassDEP Representative

Benjamin P. Gregson July 16, 2012
IAGWSP Representative

Table 1 Approved Changes to Groundwater Chemical Monitoring Network – Western Boundary

Distribution: L. Jennings and J. Dolan (EPA); L. Pinaud and E. Jacobs (MassDEP); B. Gregson, D. Hill, and P. Richardson (IAGWSP); J. Ehret, G. Kaso, D. Brammer, M. Anderson, and M. Wojtas (USACE).

Table 1
Approved Changes to Groundwater Monitoring Well Network - Western Boundary

Well ID	Northing (utm)	Easting (utm)	Ground Elevation (ft msl)	Screen Top Elevation (ft msl)	Screen Bottom Elevation (ft msl)	Analysis	Sample Collection Frequency	Rationale
4036000-01G	4618217.21	366248.29	-	-	-	P	Q	
4036000-03G	4618381.83	367191.80	-	-	-	P	Q	
4036000-04G	4618697.41	367080.81	-	-	-	P	Q	
4036000-06G	4617941.90	366812.80	-	-	-	P	Q	
MW-02-04M1	4618780.52	367277.62	77.74	-45.26	-55.26	P	A	Measure perchlorate concentrations immediatey upgradient of the Monument Beach Well Field.
MW-02-05M1	4618058.32	366978.59	52.89	-57.11	-67.11	P	A	Monitor concentrations within the Monument Beach Well Field
MW-02-05M2	4618058.44	366978.75	52.89	-39.11	-49.11	P	A	where perchlorate has been historically detected at low concentrations.
MW-02-05M3	4618058.56	366978.84	52.89	-17.11	-27.11	P	A	
MW-02-07M3	4618488.98	367615.25	68.27	21.27	11.27	P	A	Measure perchlorate concentrations immediatey upgradient of the Monument Beach Well Field.
MW-02-08M2	4618319.93	367635.29	56.06	-25.94	-30.94	P	A	Measure perchlorate concentrations immediatey upgradient of the Monument Beach Well Field.
MW-02-08M3	4618320.05	367635.38	56.06	-5.94	-10.94	P	A	
MW-02-09M1	4618193.90	367625.46	42.87	-31.13	-41.13	P	A	Measure perchlorate concentrations immediatey upgradient of the Monument Beach Well Field.
MW-02-09M2	4618194.02	367625.59	42.87	-16.13	-26.13	P	A	
MW-02-13M1	4618193.80	366568.28	54.74	-43.26	-53.26	P	A	Monitor concentrations within the Monument Beach Well Field
MW-02-13M2	4618193.92	366568.37	54.74	-28.26	-38.26	P	A	where perchlorate has been historically detected at low concentrations.
MW-02-13M3	4618194.04	366568.50	54.74	-13.26	-23.26	P	A	
MW-02-15M1	4617903.68	367771.64	87.54	-37.46	-47.46	P	A	Measure perchlorate concentrations immediatey upgradient of the Monument Beach Well Field.
MW-02-15M2	4617903.80	367771.79	87.54	-13.46	-23.46	P	A	
MW-213M2	4618444.95	368400.66	94.53	5.53	-4.47	P	A	Track perchlorate concentrations crossing the Camp Edwards installation boundary upgradient of the Monument Beach Well Field.
MW-213M3	4618445.07	368400.78	94.53	17.53	12.53	P	A	
MW-226M2	4618150.12	368726.94	164.18	-10.82	-20.82	P	A	Confirm the continued declining trend in upgradient perchlorate concentrations.
MW-233M3	4618768.26	369178.87	250.55	19.55	9.55	P	A	Monitor changes in the distribution of perchlorate in the northern portions of the study area.

Table 1
Approved Changes to Groundwater Monitoring Well Network - Western Boundary

Well ID	Northing (utm)	Easting (utm)	Ground Elevation (ft msl)	Screen Top Elevation (ft msl)	Screen Bottom Elevation (ft msl)	Analysis	Sample Collection Frequency	Rationale
MW-268M1	4618925.74	368480.44	98.52	1.52	-8.48	P	A	Track perchlorate concentrations crossing the Camp Edwards installation boundary upgradient of the Monument Beach Well Field.
MW-269M1	4618369.50	369153.66	231.53	24.53	14.53	P	A	Confirm the continued declining trend in upgradient perchlorate concentrations.
MW-276M3	4618059.00	369569.97	240.86	55.86	45.86	P	A	Confirm the continued declining trend in upgradient perchlorate concentrations.
MW-280M1	4618919.00	369035.41	214.56	-40.44	-50.44	P	A	Monitor changes in the distribution of perchlorate in the northern portions of the study area.
MW-280M2	4618918.50	369035.41	214.56	12.56	2.56	P	A	
MW-280M3	4618916.00	369035.78	215.09	30.09	20.09	P	A	
MW-80M1	4618191.76	368355.69	94.37	-35.63	-45.63	P	A	Track perchlorate concentrations crossing the Camp Edwards installation boundary upgradient of the Monument Beach Well Field.
MW-80M2	4618191.82	368354.69	94.47	-5.53	-15.53	P	A	

Notes:

utm = Universal Transverse Mercator

ft msl = Feet Above Mean Sea Level

- = Not available

P = Perchlorate analyzed by Method SW846/6850

Q = Quarterly

A = Annually